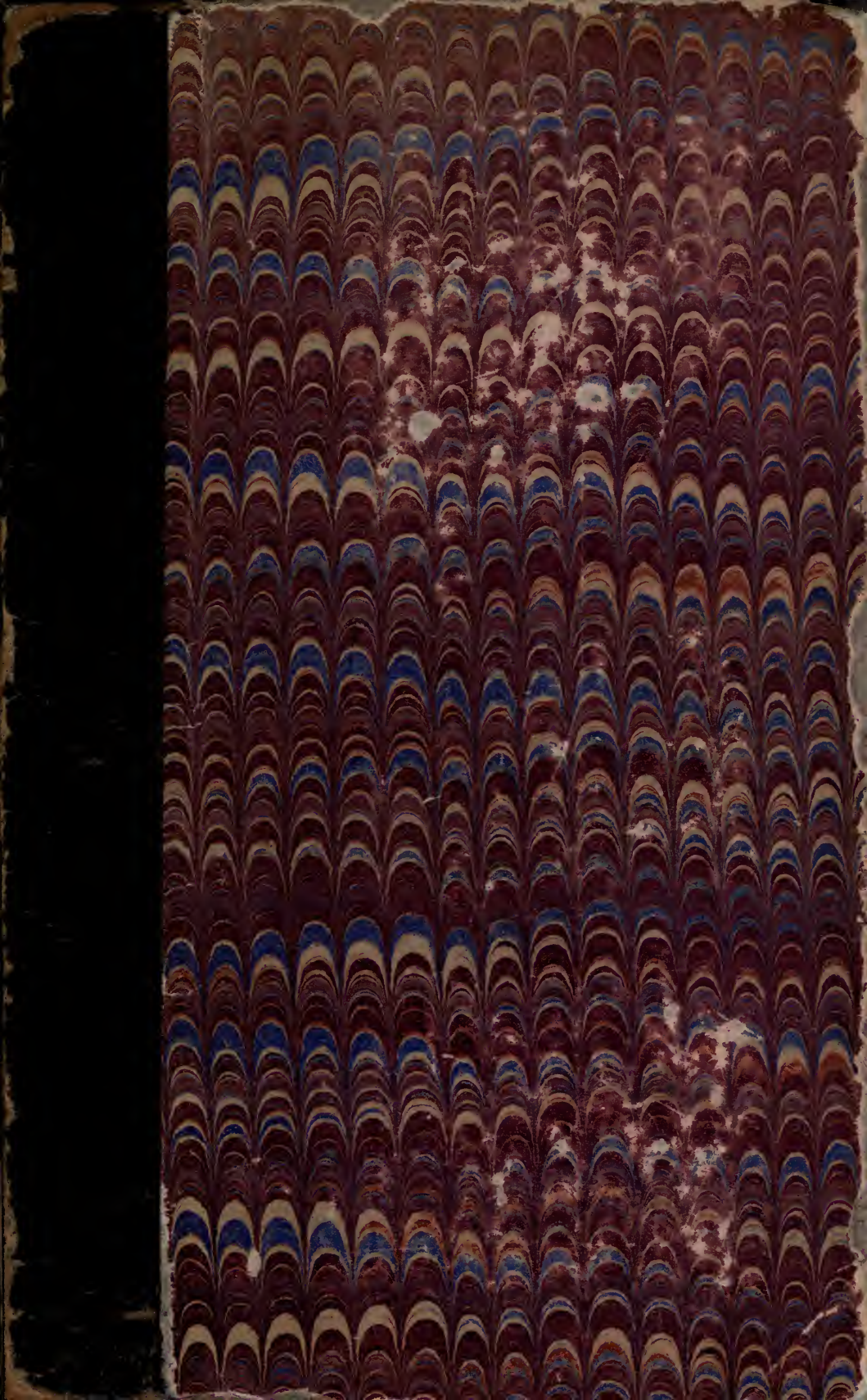






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1879-80.

BERKELEY:

1879.

*Clipped from the
San Francisco Chronicle
[Sept. or October?] 1891 [H. Rowell]*

The subject of irrigation, it may well be claimed, is the most important consideration affecting the welfare of the State as a whole which has ever confronted the people of California. It will be conceded without question that it is in the development of her agricultural and horticultural possibilities that the greatest and most permanent sources of wealth and prosperity in this State are to be found. While it is true that many branches of the industries mentioned have been successfully pursued in various localities without the aid of irrigation, yet it must be conceded that development on those lines has nearly if not quite reached the utmost extent of which it is capable. Further progress to any considerable extent must depend in great measure upon the facility with which land and water may be brought into the closest relationship. For many years it was considered a mark of superiority for any particular locality to be able to claim that "crops could be grown without irrigation." Why this should have been so is one of those things that passes understanding. When it is learned that, through irrigation, the single great element of chance is eliminated from the operations of the farmer, who is thereby made independent of the freaks and idiosyncrasies of the weather and is enabled to plow and plant in the absolute certainty of harvesting, whether the rainfall be light or heavy, one would naturally suppose that such a boon would be regarded as little less than priceless. Certainly if an Eastern farmer were asked what was the greatest drawback under which he labored, he would assuredly reply that it was the painful irregularity of the rainfall, through which his fields were liable to be flooded at one time or burned up at another, and were he to be assured that an easily found remedy existed therefore he would go to any extent to avail himself thereof.

These facts are coming to be better understood all the time, and it has gradually come about that irrigation, instead of being regarded as a process to be avoided, if possible, and only made use of when driven to by necessity, is now welcomed as a means of escape from bondage, and one of the greatest boons that was ever devised for the benefit of the tillers of the soil.

The remarkable advance that has been made in the popular confidence in irriga-

tion as an aid to the farmer, is seen in the fact that whereas but a few years since the irrigated area was confined to a comparatively limited locality in the southern part of the State, irrigation enterprises are now either in full operation or are being actively promoted all the way from Mexico to the Oregon boundary line. Many localities which in the past most persistently maintained that irrigation was not needed have fallen into line, and are now prominent in the movement, which will not cease until every acre of arid land shall have been provided with the means for making it productive. All the way from San Diego to Shasta comes the note of the inauguration of enterprises by which arid lands are to be reclaimed through the aid of waters led captive, and fertile lands to be made even more productive through the same agency. The periodical summing up of the growth in population and wealth of the State and Nation emphasizes with all the force of indisputable facts and figures that the greater portion of the advancement made in this State within the past decade has been almost exclusively confined to those districts where irrigation is practiced. As will be shown in detail, the contrast between these localities and those where irrigation is unavailable, or where opportunities for so doing have not been taken advantage of, is simply startling. Without exception, wherever irrigation enterprises have been inaugurated, there has been a rapid growth in both population and wealth. Thousands of acres of hitherto worthless lands have been converted into orchards and vineyards of phenomenal productiveness. Cities and towns have sprung up in an almost magical manner, railroads have been built in every direction, and wealth has multiplied by tens of millions.

On the other hand, with few exceptions, the unirrigated sections have either stood still or have actually retrograded. Population has in many cases fallen off, wealth has decreased and a general era of stagnation has set in. The old cry of the lack of necessity for irrigation has lost its force. It is true it is still sometimes heard, but the question need no longer be discussed. It is sufficient to point to the undeniable records showing the comparative progress of irrigated and unirrigated sections. In the face of those records the most ardent anti-irrigationist

must hold his peace. He is not left with an argument which is not completely answered beforehand.

Important as irrigation is, however, and great as has been the progress made during the last decade, a critical point has now been reached. Difficulties have arisen which require to be surmounted if any great degree of further development is to be expected. From a merely local or individual question irrigation has become a subject of national importance. It is useless, however, to look to the general Government for assistance in this matter, and hence the difficulties must be met and conquered at home, or at least within the boundaries of this State. What those difficulties are and how it is proposed to meet them it is the task of the CHRONICLE to show, and they will be briefly outlined here.

The first systems of irrigation made use of in California were of the crudest character. A single settler near some source of supply built a small canal and diverted the water upon his own land. Sometimes a dozen or more neighboring farmers joined in a sort of co-operative plan and constructed and maintained the canal together. Only the most readily and cheaply obtainable water was utilized. No expensive work was done on the canals, there being rarely any outlay beyond the personal services of the irrigators themselves. Many such systems were constructed without the expenditure of a dollar in money. This plan lasted very well so long as irrigation was practiced on but a small scale and population remained sparse. But as time went on the land became occupied by thousands who desired water for irrigation. Individual enterprise and capital were unequal to the task of supplying this demand, and hence arose the stock company for the construction of irrigation works. Canals were built costing hundreds of thousands of dollars, and water was diverted from every available source. Under this system many of the most prosperous settlements in the State were founded, and millions of dollars were invested, which bore fruit in the rapid increase of population and wealth.

As time went on, however, it became apparent that, valuable as this method of irrigation development had proved, it possessed features which were of an objectionable character. It tended to the crea-

tion of a monopoly in water, by which the owners of land needing irrigation were at the mercy of corporations who had the power to increase the rates demanded at their own will. Obligated to have the water or see his growing crops perish from drought, the farmer found himself in a most unpleasant situation, and a very little experience showed the necessity of so complete a wedding of land and water that the one should control the other, and there should be no diversity of interest.

Then, too, all the easily available sources of supply were utilized, while there still remained many millions of acres of land desiring and needing irrigation. To provide such lands with water involved the expenditure of vast sums, far beyond what private capital could be induced to invest. Storage reservoirs were seen to be a necessity, while the construction of expensive systems of canals was needed to cover the vast area of arid lands that could only be made productive through the aid of irrigation.

Various suggestions were made to meet the emergency, and finally from the necessities of the situation and the crystallization of opinion upon the subject arose the passage of the measure known as the Wright Irrigation law. As amended that law is given herewith, being the foundation upon which there is certain to be a growth through irrigation development which shall throw into the shade all that has been accomplished heretofore. That law has stood the tests of the courts, has been pronounced constitutional by repeated decisions, and is regarded wherever irrigation is a necessity as an epitome of the best knowledge upon the subject.

This law provides for a district system of organization, by which the people in any given section, the lands of which are irrigable from a common source, may form an irrigation district similar to all intents and purposes to a municipal corporation—a city or county. Having determined upon the source of supply and the most feasible manner of constructing the necessary works, estimates are made of the cost of such works and the people interested are empowered to vote bonds to defray that cost. These bonds are a first lien upon all the property in the district to be benefited, and the payment of interest thereon



A type of the effects of irrigation.

and their redemption is to be made through taxes regularly levied and collected in the same manner as in the case of city or county bonds. Manifestly, such a security as this possesses features scarcely surpassed by any other that could be mentioned. It is, in reality, a first mortgage upon all lands in the district. But, unlike the money loaned upon mortgages, the proceeds of these bonds are directly devoted to the enhancement of the value of the original security, thus giving them an added value which is surpassed by no other form of bond.

As will be shown in the discussion of the legal aspects of the situation, these bonds have exactly the same foundation as a city or county bond, and they should be as favorite an investment as such securities. No one, of course, will be so foolish as to put himself on record as indorsing the bonds of each and every district that may be organized. There may be fatal defects in various respects that can only be ascertained by investigation. But the broad

of the district to meet its obligations, just as in negotiating a loan on a piece of city property it is necessary to search the title, appraise the value, etc.

Under the Wright law there have been some thirty-two districts organized, and bonds to a large amount have been issued. In some cases these securities have been used in payment for water rights and irrigation works already constructed, but in the majority of instances it was expected to sell the bonds and devote the proceeds to the construction of the necessary works. Unfortunately, at this juncture an obstacle was encountered in the shape of a very general popular ignorance in regard to the subject. This ignorance prevented that confidence from being reposed in irrigation bonds as a security which was absolutely essential to assist in their disposition. While there was no avowed opposition to them, still the attitude of non-interest was as fatal to the inducement of investment from the outside as active opposition would have been.

It became evident, therefore, that a campaign of education was necessary, and into that campaign the CHRONICLE has entered heart and soul. The irrigators themselves have done good work during the last two months in obtaining the indorsement of prominent commercial bodies and business men for irrigation bonds. Their efforts, however, have been handicapped in

more ways than one. The lack of a concise and complete statement of the entire situation has been keenly felt, while the multiplicity of questions that arise require vast labor and much time in explanation.

In the present edition the CHRONICLE has undertaken the task of presenting the entire question in such shape that every possible inquiry can be met. The Wright law and all its amendments is given, so that those interested can study it for themselves and become familiar with all its minutiae. Concise summaries of the scope of the law are also given by able writers, so that readers with no taste for legal terms can, at a glance almost, understand just what the law provides.

Supplementary to the law and its explanation, a history of the litigation which has arisen in various districts is given, showing the points covered by the repeated decisions of the Supreme Court, in every one of which the constitutionality of the law has been sustained. This portion of the history of the act should be read with especial care, as it affords the clearest exposition of the various disputed points, an understanding of which will prevent much misconception and clear away a great deal of misapprehension which might otherwise result in unnecessary litigation.

Contributions upon the subject of irrigation from the pens of such able financiers and business men as C. P. Huntington, A. L. Rhodes, Francis S. Newlands and others are given, showing the estimation in which irrigation is held by them, as a factor in the development of the State and the building up of the wealth of the people. The value of irrigation bonds as a security is also touched upon in no uncertain terms, and their indorsement, coming from such a source, is one of the strongest that could be received.

Supplementary to these papers are the written indorsements of a large number of the most prominent bankers in this city and throughout the State, in which irrigation bonds are recommended as a high-class security. Many of these indorsements come from financiers who have had an opportunity of personally watching the growth of wealth through irrigation enterprises, and who are fully aware of the value of securities based upon such a foundation.

A particularly notable feature is the series of interviews with leading business men upon the subject of irrigation. These

interviews are especially valuable as removing the impression that has obtained to some extent that San Francisco was indifferent to the development of the interior. As will be seen from a perusal of the utterances given, the best business men of the city are fully alive to the fact that the interests of San Francisco and of the interior are closely bound together—so closely that influences unfavorable to one are equally so to the other, and whatever benefits the one is certain to operate similarly to the other. There can be no escaping this logic, and it is gratifying to find so many willing to put themselves on record in the unreserved manner shown.

An interesting portion of the accompanying matter is that devoted to a sketch of the irrigation work done in this and in foreign countries. A graphic picture is thus afforded of the vast benefits conferred upon communities where irrigation is the rule. The immense increase in wealth is shown in an unmistakable manner, while the fact that the greatest growth in population and wealth in California for the past two decades has been in those localities where irrigation enterprises have been most largely fostered is demonstrated in the most convincing shape.

Many of the more notable instances of the reclamation of desert lands through the aid of irrigation are given at length. It is certain that nowhere in the world has there been such an entirely unique development in many respects, and for this reason especial emphasis is given to the wonderful work done at Riverside, Anaheim, Redlands and elsewhere. Those places are types of what may be expected wherever intelligent enterprise and sufficient capital engage in the work of reclamation.

The CHRONICLE has, in a word, aimed in the present edition to present a full, impartial and correct statement of the condition of irrigation as it exists to-day in this State. It has endeavored to leave no possible question unanswered, but to furnish the fullest and freest information upon every branch of the subject. How well the task has been performed the reader can decide for himself.





San Bernardino mountains and Redlands valley.

IRRIGATION ABROAD.

WHAT HAS BEEN DONE IN THE OLD WORLD.

Extensive Systems in India, Spain, Italy and France—Sources of Great Wealth.

Were one to undertake to write a history of irrigation he would be obliged to write a history of the human race. The first man who undertook to till the soil, if we are to believe the biblical narrative of the creation, found it necessary to resort to irrigation, for we are told that the garden in which Adam and Eve passed the happiest portion of their lives was watered by a river which went out of Eden. That this is no forced construction of the sentence, "And a river went out of Eden to water the garden," is apparent from the fact that in all that region where the habitation of the first man is believed to have been located irrigation has always been a necessary adjunct to the successful cultivation of the soil. The Bible, too, is full of allusions to the practice of irrigation, and profane history from the earliest times contains an abundance of proof that the uses of water as an aid to agriculture were well known to the most ancient people. In Africa and Asia, too, are to be found the remains of vast systems for the storage and diversion of water. Massive dams and canals of solid masonry still remain, and in some cases are even yet in use, whose origin is lost in the mists of antiquity. That there is nothing new under the sun is shown by the fact that the best engineering skill of modern times is unable to improve upon the methods of people whose very existence is but a tradition

and would never be suspected were it not for the enduring monuments of stone left behind. The history of irrigation in the old world is full of interest to the people of the American Continent, since it affords so many examples for guidance in what is in most cases an untried art on this side of the Atlantic.

INDIA.

Vast Canal Systems and Immense Area Irrigated.

Like many another art of the greatest value to moderns, it is not improbable that irrigation had its birthplace in India. Certain it is that from the remotest times it has been extensively practiced, while systems of storage and diversion are still in use that have been in existence for thousands of years. At the present time there are upward of 20,000,000 acres of land under irrigation in India, and as the English Government has taken an active part in fostering new enterprises for the diversion of water, as the best means of preventing or alleviating the periodical famines that prevail in that country, large additions are being constantly made to the irrigated domain.

In an address recently delivered before the American Society of Civil Engineers at Washington, Herbert M. Wilson described in detail the irrigation system of India, and a few of the more salient points are condensed therefrom. There are three varieties of irrigation works in use in India. There are canals with a perennial flow, those that serve to utilize the surplus in seasons of heavy rainfall, and those that are supplied by storage works. The streams which provide the perennial canals with water are far larger than any American rivers which are utilized for irrigation. The diversion of their waters is accomplished by masonry dams or weirs of massive construction, which are so arranged with sluice gates that there is no longer of damage during seasons of unusually high water.

Of all the irrigation systems in India the greatest is the Ganges canal. Its head works are peculiar, the discharge of the river being much greater than the amount

of water needed, and the current swift, while the bed is composed of bowlders to a great depth. It was deemed advisable to divert the water by means of a temporary bowlder dam into the Hurdwar channel, and this is kept open and separate from the remainder of the stream by an elaborate system of river training works. These temporary weirs—for there are three of them, one back of the other—are destroyed annually by the floods and rebuilt each year, this method being cheaper than to construct a permanent weir. This canal controls 10,440,000 acres, or which it irrigates 1,000,000 acres, and has 456 miles of main canal, 2599 miles of distributaries, 895 miles of escapes and drainage cuts, and its total mileage is 3910. Each distributary would be a large canal in America, and has numerous masonry bridges, regulators and aqueducts along its line.

Another great canal system is that of the Sirhind canal in the Punjab. The diversion works consist of the usual weir with undersluices in it, and regulators at the canal head. In the first few miles the fall is great, and there are a number of drainage works, of which the Siswan Superpassage carries 20,000 second-feet and the Budki Superpassage 30,000 second feet of water. The main canal and principal branches are in all 4950 miles in length, of which 503 miles are main navigable canal. Its discharge is estimated at 7000 second-feet, though it generally carries only from 3700 to 4000 second-feet.

The gross area commanded by the canal is 4,521,000 acres, of which 800,000 acres are irrigable. In the autumn of 1889 the duty of water per second-foot on the supply entering at the canal head was 119 acres or \$113.

The total original cost of the works was \$12,000,000, of which, exclusive of cost of land and maintenance, \$400,000 was for headworks, \$6,500,000 for the main canal and branches, exclusive of \$1,100,000 for right of way and navigation works, and \$800,000 was for drainage and protective works.

For 800,000 acres of irrigable land the earthwork cost \$1.25 per acre; or—our contract prices in the West being say 10 cents per cubic yard, while theirs is but 4 cents—this earthwork would have cost us \$10.62 per acre. The masonry works, such as falls, weirs, regulators and bridges, cost in all \$2,400,000, or \$3 per acre irrigated. Rubble masonry costs in India about \$3 per cubic yard. In the West it averages say \$6. Hence these masonry works would have cost us \$6 per acre.

In our works we would avoid the expense of the numerous masonry bridges constructed in India. Say one-third can be deducted for the cheaper material and less masonry work, and it would cost us \$4 per acre irrigated. Drainage works cost about 73 cents more per acre, or say in all the Sirhind canal would have cost us \$15.35 per acre irrigated, against \$8 in India.

The water rates charged averaged 90 cents per acre irrigated; we would charge at least \$2; in some localities far more. As the cost of construction in America would be twice what it was in India, while the receipts per acre are more than double those of India, it is not improbable that under similar circumstances such a work, when partially utilized, would yield

us 5 per cent, and when doing its maximum duty would realize 10 per cent, net profit on the capital invested, besides furnishing homes for many thousands of people, and largely increasing the aggregate wealth of this country.

The chief inducement to canal enterprise in America has not been mentioned, because it does not exist in India. This is the increment in value of the land served by the canal. There is no such increment available to private enterprise in India, because the Government is the sole owner of the land. Here, however, where land can be purchased for from \$1.25 to \$2.50 per acre, and when irrigated will sell for from \$40 to \$100 per acre, or bring an equivalent revenue, the increased return on an investment is obvious.

The great extent of this country, its topographical features, its enormous population and the volume of its large rivers permit and require canals of length and section surpassing beyond all comparison any to be found elsewhere, unless it be in the single instance of the Imperial canal in China.

The great Ganges canal is arranged for navigation as well as for irrigation, its aqueducts and embankments being built upon a scale which is unequaled in modern times. The canal was built and projected by the Government. The other canals of importance in the northwest provinces and the Punjab are the Eastern Jumna, the Western Jumna and the Bari Doab canals, carrying from 2000 to 3000 feet of water per second and each several hundred miles in length. Passing from Northern to Southern India one finds in the delta of the Canvery, the Godavey and the Kistna rivers a comprehensive system of canals, no one of which, indeed, can compare in length or in dimensions with those just named, but which, taken together, irrigate very large areas in their respective deltas. These delta systems have enriched people and State alike. They have placed declining districts in a condition of high prosperity, and have produced this result in a very short time.

Under the care of the British Government irrigation enterprise in India is making great headway. Among the systems that have been commenced and partially completed within a comparatively recent period are the Soonsekala and Bel-lairy canals, from the Toombuddra river, 350 miles long; the Soane, just completed, from the river of the same name, to carry 4500 cubic feet per second, with a capacity to irrigate about 1,000,000 acres; the Sirhind canal, from the Sutlej river, to cost \$15,000,000; the Lower Ganges canal, to carry 6000 cubic feet per second; the Orissa canal, built by the East India Irrigation Company, all of which are very large enterprises, some of them rivaling the Ganges canal in magnitude and importance. To these may be added the Agra canal, from the Jumna, and the Eastern Ganges canal. All of these except two have been built or restored by the Government, which owns all of them but one.

Many of the larger canals have been constructed for navigation as well as irrigation, the toll collected from freight and passenger traffic forming one of the regular items of the annual reports. Tremendous engineering feats had to be performed at the head of some of the big

canals, where the Ganges and other streams were tapped at the foot of the Himalayas. To carry the canal through certain districts the tracks of mountain torrents had to be crossed in many instances. Sometimes the torrents had to be diverted in other directions and sometimes they were provided with broad channels of masonry to carry them peacefully over the bed of the canal. Monster weirs had to be built across the big rivers whence the supply of water is taken, and the canal carried across broad streams on aqueducts. The Ganges canal, for instance, crosses the Solani river on an immense aqueduct three miles long. The aqueduct consists of earthwork approaches, which carry the canal across the low valley subject to overflow, and fifteen arches of masonry of fifty feet span each across the normal bed of the river. Over this aqueduct flows a stream 200 feet broad and twelve deep.

The financial results of the different systems form an instructive field of observation, as showing the vast difference in the receipts in the proportion of outlay that may be obtained from enterprises of the same general character in our country.

One canal system, for instance, known as the Canvery system, in the Madras Presidency, returns 81 per cent profit per annum on the investment, and some of the smaller canals even more than this. On the other hand, many of the systems show an annual deficit, owing to the tremendous cost of construction and proportionately less cultivable land to supply with water. Taking the canals as a whole, however, they are a very good property, paying the shareholders on an average as

much as 10 per cent. The tanks, it has been calculated, afford a revenue of about \$7,750,000. It may be noted, in conclusion, that in India the Government is really the landlord, a circumstance which makes the obligation of irrigation peculiarly strong, and which at the same time insures a share of profit which could not inure to a private company.

ITALY.

Governmental Control of Waters and Systems of Diversion.

Both in the laws regulating the control of the water and in the appliances for irrigation Italy stands easily at the head of all the countries in which this art is practiced. From the earliest times the importance of an artificial supply of water in the cultivation of the soil has been recognized, and every effort has been devoted to securing the best means for conferring the greatest benefits upon the people at large. The result has been the establishment of a code of laws which might well be patterned after by other irrigating countries.

It will be of interest to glance at the more important features of the laws governing this subject, as valuable hints may be derived therefrom. In the first place, the waters of running streams are recognized as the property of the Government, or, rather, of the people as a whole, and no one is allowed to interfere with them without first obtaining a concession.

Riparian rights, as they are defined by the English common law, have no existence in Italy.

In all cases when it is desired to make use of water for irrigation the proper authorities must be applied to for permission. After careful examination, if it be found that existing rights will not be injuriously affected and that no one will be damaged by the proposed new works, a concession is granted. The act of concession describes the quantity, manner and conditions of the diversion, conduiting, using and of the restoration of the waters, the quantities required in the interest of agriculture, industry, commerce and public health, and names the annual rent that is to be paid to the government treasury for the use of the waters. The time within which the full amount of the conceded waters has to be diverted and utilized, under pain of forfeiture, is also specified, and discretion is given a competent authority to cut short this term when it becomes justified by delays in the execution of the works. Temporary concessions are made for terms not exceeding thirty years, but at the expiration of such term the grantee has the right to obtain a renewal of his privileges for another term, and so on successively, saving the modifications which altered conditions of the locality or of the watercourse may render necessary in the agreement of concession. The renewal of a concession may be denied when in the preceding term the waters have not been used, when the privilege has been abused, or when, in the judgment of the administration, the grantee has not used his privileges for the proper and specified purpose.

When an application is made for a new privilege it must be accompanied by plans for the works proposed to be built for the diversion, conducting, use and restoration of the water, which are presented to the prefecture of the province and are thence communicated to the provincial deputations interested for their observations. Then the projects are published in the interested communities, notifying all interested parties to be present at a specified time to present their views. The provincial civil engineer goes over the ground with the applicants and other interested parties and reports his opinion. If it be favorable the desired concession is granted.

From the foregoing it will be seen that were the same system applied in California much of the litigation and almost endless disputes over water rights would be prevented, and that no such thing as monopoly in water could prevail.

Irrigation has been extensively practiced in Italy from the very earliest times, and the ancient literature of that country is full of allusions to this subject. The first comparatively modern authentic instance of a canal for this purpose is one taken from the Vettabbia river by the Cistercian monks of Chiravelle in the twelfth century. About the same time the Naviglio Grande canal from the Ticino river was built, and in 1520 the large Canal Muzza was commenced. In the fourteenth century no irrigating work of importance was executed. In the fifteenth century the Canal Martesana, one of the earliest provided with locks, was built. In the interval from the end of the sixteenth to the begin-



An Anaheim colony home.

ning of the nineteenth century very few canals were constructed, the canal of Pavia belonging to the nineteenth. It was, it is true, first opened in the fourteenth century, but it fell into disuse, and was only ordered to be rebuilt by Napoleon in 1805, being completed in 1819.

In Piedmont the canal system dates from a later age, the first works having been executed in the fourteenth century. In the fifteenth century there was considerable activity in this kind of enterprise, but in the sixteenth, seventeenth and eighteenth centuries there was but little extension of irrigation. In the nineteenth century the canal of Charles Albert and the Cavour canal from the Po were constructed, the last being worthy of special mention.

The principal object of the work was to supply water to the canals already existing, particularly at the low stage of the rivers from which they drew their supply, at which season the Po has generally water to spare. The originally estimated cost was \$7,070,000, but the contract of the canal was let for no less than \$8,875,000, while contingent expenses, damages and other matters raised the total estimated cost to \$10,660,000. Then the purchase of the Crown canals—a part of the agreement—and expenses accruing before income was realized brought the total sum to be paid out by the company up

to \$16,600,000. The nominal capital of the company was \$16,000,000, but although the Government guaranteed the interest at 6 per cent on that amount, from the time the work was opened, it never went anywhere near par, its actual resources never exceeding \$12,200,000. It failed and the works were thrown back on the hands of the Government. The Government at once went actively into the work, and the canal was built. It is a most noble work. The

works are constructed in the most substantial manner, with stone-riveted banks in many places, and with solid masonry headworks, bridges, outlets, sluiceways, overfalls, syphoons and other structures.

Laws governing the practice of irrigation occupy a very prominent place on the statute books of Italy, and the attention of legislators has been frequently devoted to their amendment. The principal point in the present irrigation laws of Italy consists in the formation of irrigation associations, much after the fashion of the irrigation districts of this State. The canals are generally owned by the Government. They are under the control of the Finance Department, which has a staff of engineers to superintend the repairs and to see that the works are kept in efficient order. The usual practice is for the Government to farm out the canals to contractors. These arrange with the cultivators for the distribution and measurement of the water, and fix the rate of payment, under some restrictions. Disputes between the contractors and cultivators are settled by the civil tribunals. Each canal forms a district for administration, but it may include more than one district. In each district, under regulation prescribed by the Government, the irrigators form associations, which administer the affairs connected with the distribution and use of the water.

In Piedmont the total quantity of water applied to irrigation is 8290 cubic feet per second, not counting the supply of the Cavour canal. The total area of irrigable land commanded by these canals is stated to be 1,335,680 acres. Deduct one-third for roads, villages, marshes, etc., the net irrigable land will be about 900,000 acres, of which 306,000 are actually irrigated. If one adds the scattered irrigation in the upper valleys of Piedmont not before included, amounting to 180,000 acres, the

total area irrigated is 486,600 acres.

In Lombardy about one-fifth of the total area of territory is irrigated. Between the rivers Ticino and Adda nearly nine-tenths of the surface, between the Adda and the Oglio two-tenths and between the Oglio and the Adige one-seventh of the plain are irrigated. It is estimated that the aggregate length of the canals and their principal branches in Lombardy exceeds 4500 miles.

To sum up it may be stated that Italy employs for irrigation more than 24,000 cubic feet of water per second, supplying 1,600,000 acres of land. It is estimated that there has been expended for the irrigation of 1,000,000 acres in Lombardy not less than \$200,000,000. This expenditure has been spread over 700 years, and has made Lombardy a garden.

SPAIN.

The Source Whence California Derived Its Irrigation Customs.

The practice of irrigation in Spain possesses peculiar interest for Californians, since it was from that country that we derive many of our customs in that connection. It is true irrigation was practiced in Mexico and South America long before the Spanish occupation, while in Arizona are the traces of irrigation systems constructed by a people that were extinct centuries before the Spanish conquerors landed on the American coast. The foundation of the irrigation system of California, in fact of the entire country, was laid, however, by the Spaniards who founded the missions on the Pacific Coast, and to them should be given the honor of inaugurating the system to which, more than anything else, California owes the proud position which she occupies to-day. The irrigation systems of Spain possess still further interest for us, because the climate of that country corresponds more nearly with that of the irrigated regions of California than any other country.

It is in the central portion of Spain that irrigation is most extensively carried on. This is a region something like 300 miles square, and is composed of a series of great plateaus, separated from each other and bounded north, east, south and partly on the west by ranges of mountains. These plateaus lie at elevations between 500 and 3500 feet above the sea, and slope generally from east to west. The mountains on the east present a continuous formation as a chain, and rise to but moderate heights above the hills bordering the plateau plains, but their eastern slopes are abrupt, and dropping to near the level of the sea, leave a narrow fringe of plain land between their feet and the Mediterranean, behind which they stand as a high, rugged range. North of the plateau region, and lying between it and the feet of the Pyrenees, is the valley of the Ebro, near 200 miles in length and from fifty to 100 wide, opening out upon the Mediterranean toward the east. South of the plateau region lie the valleys of the Guadalquivir and the Genil, sloping in the opposite direction from that of the Ebro, and opening out on the southwest coast of the country. South of these last named valleys lie the Sierra Nevada mountains,

seen whose southern slopes and the Mediterranean is a narrow border of sloping plain lands, only somewhat less wide, and less continuous and connected than the seacoast plain of the eastern face of the country.

These plateaus receive as a general thing less than 10 inches of rainfall per year, of which total less than 10 per cent falls during the summer months. The low plains of the eastern coast region receive from 10 to 20 inches per year, of which about 5 per cent falls in the summer. The south coast and the valley of the Genil receive from 20 to 30 inches of rainfall, but only about 5 per cent falls in the summer; while the valley of the Ebro receives about 15 to 20 inches, with only 10 per cent presented in summer. In fact, the less elevated parts of Central Spain present a climate quite similar to that of Interior California, while Eastern Spain has the characteristics of the Los Angeles valley, the productions also being almost identical in the couplets above named. In Central Spain wheat is grown by irrigation; alfalfa is a standard grazing crop, also irrigated; while grapes and temperate zone fruits are irrigated or not, according to the peculiarities of special localities. On the low plains, and in the low valleys opening out upon the plains on the east coast of Spain, citrus fruits abound, olives flourish, the grape is cultivated principally for raisins, and the presence of the date palm and other semi-tropical fruits mark the similarity to our plains and valleys of Los Angeles and San Bernardino.

The use of water for irrigating in Spain and the possession of water rights follow the same lines that are peculiar to California. In some cases the water right belongs to the land and cannot be separated from it. The sale of the land carries with it the water as an appurtenant. Similarly the grants of land made by the Spanish and Mexican Governments in California carried the water with the land. The two were inalienable.

In other instances Spanish irrigators who are owners of land rent the water for a stated sum and at stated periods, exactly as is done in this State in cases where large corporations have appropriated the water and constructed expensive storage and distribution works.

Many conflicting laws and customs obtained in Spain in regard to the control of irrigation waters, and it was not until a recent date that any uniform system was adopted. Under the laws passed within the past fifteen years, however, the Government assumes control of all canals of irrigation and navigation, wholly paid for with national funds, and all national river works; also the presenting or approval of measures of police and administration of the use of public waters and streams in all cases. The provinces have administrative control of works of irrigation and irrigation pertaining solely to their several territories and those paid for by their funds. The State may accord to a private individual, association, community, company, municipality or province the privilege of conducting any enterprise which would come under its control. A province or a municipality may delegate to others its right of construction and immediate control of municipal water works, but neither the State, municipality nor province can forfeit its right of ultimate administrative control

and regulation of works and waters.

The State is empowered to grant subsidies in aid of the construction of irrigation works. These may consist of a money gift of not to exceed 30 per cent of the actual cost of the works, of a premium of \$1415 for each cubic foot per second of continuous flow developed, and of a further premium of \$3 an acre for all the land irrigated. The Government reserves the right to expend under its own supervision all the money furnished under the 30 per cent regulation.

When communities of irrigators wish to construct works to supply their own lands the Government will subsidize them to the extent of 50 per cent of the cost of the works, and will also advance the other 50 per cent as a loan, to be repaid in small installments. This, it will be observed, meets most effectually the difficulty that is encountered under our district system in disposing of the bonds for the construction of works.

When syndicates, companies or individuals apply for a concession for the construction of irrigation works the Government undertakes the preliminary surveys, the expense of which must be refunded by the applicants, and if, after due investigation, it be decided to grant the application a concession for a term of ninety-nine years is offered at public auction to the one who shall agree to carry out the terms thereof at the least expense. If two or more bidders name the same sum, then the concession is awarded to the one who shall agree to reduce the subsidy premium the most. If the offers should still be equal on this point, then the concession is given to the bidder who places the tariff for irrigation at the lowest rates.

After the concession is granted to the successful bidder the time is specified within which each section of the work is to be completed. Forfeits are predetermined and agreed to for partial failures. Extensions of time are granted only when unforeseen natural circumstances are the cause of delay. Concessions are forfeited upon non-compliance with conditions. Such forfeiture is declared by the minister, and the enterprise and works are sold at auction for the benefit of creditors and the grantee.

Companies or individuals having concessions of this character are required to pay taxes on the lands owned by them, but under the general law of waters their capital and works are exempt from taxation.

Some interesting facts can be learned from the following statistics in regard to a number of the most prominent irrigation enterprises of Spain. They afford instructive comparisons in respect to the average duty of water, the cost of construction, and the average expense per acre of furnishing water. Among the principal canals are the following:

Caroline J. Swinyne.....C

CANAL.	Length, miles.	Capacity-cubic feet per second.	Area irrigated, in acres.	Cost.
Aragon & Cat.	104.8	1,250	257,000	\$6,000,000
Ebro.....	41.5	32	32,180	3,723,000
Urgel.....	45.9	1,180	242,140	3,382,000
Isla.....	24.8	232	22,770	630,000
Henares.....	28.5	180	28,400	946,400
Jaca.....	10.5	45	2,050	49,100
Guadalquivir	46.5	534	53,030	1,939,000
Guadiaro.....	42.8	64	4,450	133,600
Genal.....	14.3	22	1,480	32,400
De la Oliva.....	3.1	36	2,260	18,300
Mediodia.....	23.4	18	8,180	373,000
De la Obra.....	6.2	4	610	5,400
Guadlaco.....	7.5	7	817	24,600
Gevora.....	11.2	45	4,110	73,400
Guadalentin.....	24.8	107	21,740	302,800
Guadelete.....	13.0	53	4,010	107,000
Duero.....	31.6	150	19,760	866,400
Derecha del G.	37.8	107	9,690	133,400
Quadiana.....	39.0	200	16,060	439,800
Escation.....	10.5	11	750	43,800

Of reservoir concessions the following are among the more notable:

NAME.	Capacity in cubic feet..	Extent irrigated Acres	Estimated Cost.....
Torralba de Ribota.....	1,505,000	558	\$5,300
Isbert.....			420,000
Arba de Luesla	79,835,000	4,440	39,700
Montecagudo...	227,500,000	1,531	50,000
Hijar.....	420,000,000	7,460	245,500
Elda.....	2,135,000	494	5,000
Puentes.....			1,562,400
Mezulocha.....	280,000,000	3,400	65,200

The valley of the Ebro is the scene of the modern works and of present progress in irrigation, while the valley of the Guadalquivir is the scene of ancient as well as of very recent irrigation enterprise. But the irrigated Spain of which the world has heard the most is that handed down from the times of the Moors, in the valley of the Genil in Granada, and in the valleys and plains opening out on the east coast of the country, where lie the garden lands of Murviedro, Valencia, Almansa, Alicante, Elche, Orihuela, Murcia and other irrigated and highly cultivated districts. Unlike the case of the great irrigated valley of Northern Italy, the irrigation districts of Spain are very much scattered and subjected to physical conditions varying among themselves.

According to the official reports, the area of irrigated land in Spain is 4439 square miles. The principal canals irrigate some 750,000 acres. There are many small canals and a few tanks or reservoirs, which increase this area considerably. Accepting the official reports, the great bulk of irrigation is done by wheels and norias. These wheels have buckets or jars attached to the circumference, by means of which the water is raised. The motive power may be the current of the river, or it may be animal power. The remunerative character of this mode of cultivation can easily be shown. Near Valencia irrigated land is sold at from \$700 to \$900 per acre, while land of the same quality not irrigated only fetches \$80 or less per acre. Land near Madrid is increased in value by irrigation from



four to tenfold. About Castellon the average price of irrigated land is \$700 per acre, and for non-irrigated land \$50 per acre. In the valley of the Esla irrigated land is worth \$600 per acre and dry land \$50. Spain, indeed, may be described as a country where the water is more valuable than the land in a ratio of from five to twenty. The Spaniards have an experience of 1000 years behind them, and they ought to be convinced of the value of this mode of cultivation. There is probably no part of the world where water is more carefully applied, and there is certainly no country where the legislation on the subject is more clear and precise.

FRANCE.

Governmental Control of the Diversion and Use of Water.

In France, as well as its immediate southern neighbor, are found many climatic features which resemble those that exist in California. In large areas the rainfall is so light that irrigation is essential to the profitable cultivation of the soil, while there are still other extensive sections where farming operations are possible without the artificial application of water, though made much more profitable by that process.

The departments of the Mouths-of-the Rhone and of Vaucluse, in Southeastern France, where irrigation is most common, are in a region of wide open plains or rolling lands near to the level of the sea, where the temperature is high and rainfall very light, and artificial watering of all crops is an absolute necessity, even on the richest of soils.

In the department of the Pyrenees, in Southwestern France, a peculiar irrigation of natural meadows and other vegetation is found in the mountain valleys high above the level of the sea, with destructive meteorological surroundings, while along the base of these mountains irrigation is again found on extensive plains and rolling lands of moderate elevation and medium range of temperature and precipitation.

In the department of Vosges, in Northeastern France, is found that peculiar irrigation of meadow lands where water is used almost continuously, notwithstanding heavy rains well distributed throughout the year.

In Northwestern France artificial watering has reclaimed and made productive and populous vast tracts of lands formerly barren and covered with drifting sands or scanty natural pasturage.

Throughout France market gardening and fruit-raising are largely dependent upon irrigation, which is very extensively practiced for these purposes, as well as for growing fodder and plants used in manufacturing textile fabrics and dyestuffs. Of late years, too, the application of water on vineyards to drown out or prevent the spread of phylloxera has become quite common, and is directly fostered by Government aid in various ways.

Besides the very great variety of physical conditions and results surrounding and attending irrigation we find in France an example of an attempted complete Governmental control of irrigation and water-right matters under a compara-

tively liberal form of government and amid a free and enlightened people. The Government of France has of late years specially encouraged irrigation in a variety of ways, and here one finds examples of irrigation enterprise both ancient and modern, and of all grades and forms of organization, from the small private ditch project to the large, costly and complete canal system, wholly built and managed as public works of the nation.

As a general thing, however, France is less an irrigation country from necessity and for general profit than is California, the valleys of France, with exceptions limited to small regions, receiving from sixteen to thirty-two inches of rain each year, while ours of California receive only ten to eighteen inches as a general rule. The necessity for and value of irrigation in France was not sufficiently appreciated by the generations past to bring about a general sentiment in favor of national encouragement to irrigation enterprise. Irrigation there, as in California, has been until within the past few years looked upon more as a local necessity than as a valuable auxiliary to general agriculture. Hence there has not been that widespread appreciation of the subject among the people of France which we might expect to find recorded.

The lands are very generally held in small tracts, and close and thorough tillage has taken the place of that wasteful but easy one of water, which is sometimes substituted for skill and industry. The generally humble condition of the peasant proprietors may be judged from the fact that when the association for the Canal de l'Isle (Vaucluse) was set on foot in 1845 there were 1414 subscribers, of whom 1095 desired irrigation for tracts less than one hectare (2.47 acres) each, and out of the whole number only four subscribed for areas greater than ten hectares (24.7 acres) each. The St. Julian canal, eighteen miles in length, irrigating from 6000 to 7000 acres, is the property of an association having 2060 members, and the Crillon canal, irrigating from 1600 to 2000 acres, has 750 subscribers.

The French laws governing the ownership and control of waters in running streams have undergone many changes, and have been productive of a great deal of litigation. It is a well settled principle now, however, that all streams and parts of streams that are navigable belong to the public domain and are subject to the control of the Government. The Government has the power at any time to declare any stream or portion thereof navigable, and thus assume control of its waters. For a long time it was claimed that unnavigable streams belonged to the parties through whose lands they flowed, but this position is not recognized by the Government, which holds that all such streams are the common property of the people. Riparian proprietors have certain rights to the use of water for irrigation, but do not possess an exclusive right, the Government assuming control and granting concessions for the diversion and use of such waters wherever needed. The fact of the ownership of the waters of unnavigable streams by the Nation as representing the whole people is now pretty well settled, while the same may be said with regard to navigable



Tunnel for Turlock district canal.

streams, riparian owners being restricted to a preferred use of the waters for irrigation, and nothing more.

When it is desired to utilize a stream for irrigation the parties who propose to undertake the scheme must organize and present an application to the proper authorities, accompanied by plats of the district to be irrigated, a list of subscribers, plans for the works, and evidence of the financial ability of the applicants to carry out the project. Public announcement is then made, and the interested parties are given an opportunity to be heard for or against the plan. If, after due examination, the plan shall be made to appear feasible and work no injury to any one, the authorization to commence work is granted. After the Government has authorized the construction of the works it is in a manner accountable for the meeting of the engagements of the organization which has undertaken the task. The assessments levied on the property-owners interested are collectable as taxes, not only by the officers of the syndicate or company, but by the Government itself, which may, if necessary, interfere and force collection so as to make good the debts of the district.

Lands may be condemned for the use of the district, and all the lands that may be benefited by the construction of the irrigation works are put under contribution. When two-thirds of the land has been subscribed for the other third may be forced to contribute its share to the expense.

In order to encourage irrigation the Government not only advances the funds needed in the construction of works, but also agrees not to raise the assessed value of lands to be irrigated over that given before irrigation for periods varying from twenty to thirty-five years after the water has been put upon them. What a boon that would be in this country may be judged from the fact that through irrigation land has been raised in value several hundred per cent within half a dozen

years after having been put under irrigation.

To further stimulate the operation of irrigation substantial prizes are offered for those farmers who shall have made the greatest progress during a stipulated period in the cultivation of their lands with the aid of water.

It will be of interest to note some of the leading features of the terms upon which concessions have been made for the construction of extensive irrigation systems. Thus the canal of St. Martery, built by a syndicate of English capitalists, was authorized in 1866 in the Department of the Upper Garonne. The period of the concession was fifty years, and the Government granted a subsidy of 3,000,000 francs, to be paid in ten equal installments. Loans were also authorized to be made by the department in which the works were located to the amount of 4,000,000 francs. Some 34,600 acres of land were to be supplied with water upon the basis of a cubic foot per second to ninety-three and a quarter acres. The price of water for irrigation was fixed by the Government at from \$1 95 to \$3 91 per acre annually, according to the time when application was made. The company was also obliged to lend to each land owner subscribing, should he so desire, the sum of \$7 69 per acre to prepare his land for the reception of water. A prominent feature of all the great irrigation enterprises of recent years in France has been their subsidization by the Government, an immense amount of money having been so expended during the past twenty or thirty years.

AUSTRALIA.

Great Progress Made Under the Care of the Government.

Irrigation in Australia is of comparatively recent date, yet a good beginning has been made, and as the benefits of the system have become more apparent the area supplied with water is certain to be constantly enlarged. There is no lack of

running streams in Australia to supply water. The principal rivers of the eastern watershed are the Hawkesbury, the Hunter and the Clarence. The Hawkesbury is 330 miles in length, the Hunter 300 miles, and the Clarence 240 miles. All the rivers of the eastern water-shed flow into the Pacific ocean, and are estimated to drain an area of about 50,000 square miles. The principal rivers of the western water-shed are the Darling and its affluents, the Lachlan and its affluents, the Murrumbidgee and its affluents, and the Murray and its affluents. These rivers all eventually unite with the Murray, which empties into Lake Alexandria, near Adelaide, South Australia.

The Darling river is 1160 miles in length. It drains, with its affluents, an area of 198,000 square miles. It is, however, a narrow stream, and is navigable for only very small steamers.

The Murray river is 1120 miles in length. It flows westerly and northwesterly through the whole of New South Wales and Victoria, and, as already stated, empties into the ocean near Adelaide. The average width of the Murray, from Monara to Albury, is about 240 feet, and the area drained by it and its affluents is 270,000 square miles.

There are no large fresh water lakes in Australia, and indeed, with the exception of a few estuaries of the sea, they are all shallow and untrustworthy for water supply. In most cases they are mere depressions connected with the rivers, and receive their water only in times of flood.

It is maintained in the report of the Royal Commission of New South Wales for the Conservation of Water that there are three lakes in the course of the river Darling, each of which has an area of sixty square miles, and their capacity is shown by the fact that when rapid falls occur in the Darling the overflow from them keeps the river navigable for nearly a fortnight longer than it would be otherwise. This, the report says, is an important feature, as the outlets from the Darling are in their natural state and with few exceptions no attempt has been made either to increase or regulate the supply of water.

In the lakes east of the Darling, in the county of Livingstone, an almost permanent supply of water is kept through the construction of a dam across Tallawalka creek. The cost of this, about \$20,000, was incurred by the lessees of the land. It is said that this dam threw the water into a series of lakes extending north and south a distance of eighty miles.

The report of the royal commission states that the levels of the country between the Murray and Murrumbidgee show that it is well adapted for the construction of canals. The country between the Lachlan and Murrumbidgee is more irregular, but the vast area lying between the Lachlan and the Darling, which appears as a blank on the maps of the colony, possesses some well-defined features. For instance, the waters of the Darling and Lachlan are ordinarily separated for about 200 miles, but in time of flood they spread out to within a distance of twenty-five or thirty miles of each other.

The most remarkable artesian belt in Australia occurs in the Liverpool plains, in the northern part of New South Wales,

but very little has been done to develop it. In the early history of the country water was very scarce in that district. All the rivers and creeks in the summer were turned into sand tracts. Wells were sunk there and the water has continued to flow from them ever since. The greater part of the district is what may be called good boring country, and little trouble need be apprehended from the swelling of the surfaces of the bores, as little soapstone is met with.

So much is said about the drought of Australia that very few persons are aware that the average rainfall in all the colonies will compare favorably with that of other countries. In New South Wales, a territory of 310,000 square miles, the average rainfall is 24 inches, at Sydney it is about 50 inches, at Eden it is 70 inches, but in the flat country it is only about 10 inches. The average rainfall in Queensland is about the same as that of New South Wales. The former colony, however, is more subject to tropical rains than the latter. The rainfall, therefore, in Queensland rises in some districts, as for instance Johnstone river, to 123; in other places the average is as low as 8 inches.

At Adelaide, South Australia, where there are no high coast ranges to arrest the drift of the clouds, the rainfall is as low as 20 inches. At Port Augusta it falls to 8 inches. At Perth, Western Australia, the average is 31 inches, but at Canaroon, in the same colony, it does not average more than 6 inches. At Encla it is 10 inches. The rainfall in Victoria varies from 63 inches at Cape Schanck to 12 inches at Wycherproof. At Melbourne it is about 25 inches.

The trouble, however, in Australia is that whenever there is a diminished rainfall the effects are much more disastrous than in other places, on account of the great heat of the sun and the absence of more general cultivation. A diminished rainfall of 50 per cent has at times desolated vast tracts of country. The report of the New South Wales royal commission, however, states that while one part of the country suffers from a diminished rainfall other parts have an average supply, and others again may be favored with an abundant fall. In the basin of the Darling, excluding the hilly portion, the rainfall is 12.81 inches. In the plains between the Lachlan and the Murrumbidgee it is 16.33 inches, and in the corresponding district between the Murrumbidgee and the Murray it is 14.56 inches. These rainfalls would be sufficient for ordinary crops of cereals if they came at proper periods, but the report of the commission admits that they do not. It says that as a rule in these districts when rain is most needed it comes in such small quantities as to be of little or no use to vegetation.

One of the most difficult questions with which the Australians have to deal in connection with the subject of irrigation is the best means for the storage of water. There is no doubt that most of the rainfall is of a temporary benefit only on account of its tropical character, coming, as it does, in vast quantities when it is not needed.

The Government astronomer states that rain fell to the depth of 10½ inches at Newcastle in less than two hours and a half, and that at the South Head, near

Sydney, it fell at the rate of 1 inch per hour for more than twenty hours. The report of the New South Wales royal commission recommends the establishment of large reservoirs at the heads of the principal rivers in order to store the surplus waters for irrigation.

The colonial Government in leasing or selling public or crown lands reserved of late years land deemed essential for the purposes of water supply present and future. This has brought up the whole question of "riparian" rights. The Surveyor-General required his assistants to select and recommend for reservation and public use "permanent water holes, springs and parts of rivers desirable for water supply."

These instructions have been reasonably well followed, but the commission consider that more intelligence and discretion would have resulted beneficially in securing a larger reservation of water-bearing and storage areas. In order to avoid the conferring of riparian rights more or less definite in character the official also requires his subordinates to omit meanders and contours in the matter of swamps, lakes, ponds or lagoons found within lands to be alienated from the Crown. The survey is to be run on right lines, thus avoiding all boundary issues. "The doctrine of riparian rights, which obtains under the common law of England, is not applicable to the conditions of Australia," the commission reports, and "it is calculated to be a very serious obstacle" to Australian progress. The colony of Victoria, having by enactment reserved from sale all river or stream frontages, is relieved from the dread which riparian claims always produce in an arid country. In New South Wales, however, these difficulties have arisen.

In the matter of legislation the New South Wales Commission made recommendations in the form of a drafted act, which has since become law. This act defines "water rights, National administration, district administration, water trusts, drainage works, navigation matters," and "offenses and penalties." In the preamble it is declared that the measure is designed to "define the public right" in rivers and streams and their natural courses in still waters, similarly conserved, and to create a system for the "conservation and distribution" of the waters flowing or contained, whether above or beneath the surface of the ground.

Much progress has been made in all the Australian colonies in the matter of irrigation. The laws are largely founded upon those of Spain, France and Italy and have been found to work admirably.

The full cost of Australian colonial

works up to 1883 for water supply and sewerage was as follows:

New South Wales.....	\$19,198,485
Victoria.....	23,725,750
Queensland.....	2,705,110
Total.....	\$48,629,315

Up to 1888 there were in New South Wales 248 artesian-well borings. Of these 134 flowed fresh water, 77 had saline flow, 11 were brackish, 2 were mineral, in 19 cases coal was struck, and of 7 no record is given. A later return (1889) gives for this colony, in public works, 110 tanks, 27 artesian wells, 9 dams and 7 other works—153 in all. In process of construction were 52 bored wells, 21 tanks, 3 dams and 1 weir; 77 under way, or 230 works in all. The expenditures made by the Colonial Government direct for pastoral waters up to 1888 have amounted to about \$17,500,000.

The colony of Queensland has but just commenced the work of water conservancy, and the lines of its policy shape themselves for both pastoral and agricultural supply. In New South Wales the public exertions and aid have been in the direction of town and pastoral supplies. In Victoria, besides large town works, the trend is directly in aid of agricultural irrigation.

In 1888, there were 50 water trusts in Victoria, 30 urban water districts, and 11 others proposed and forming. Of the town trusts, 20 were of a local character; 10 others were constructed by the colonial Government. There were 6 other works formed of swamp districts. These covered in all about one-fifth of the area of Victoria, or some 17,000 square miles. Up to the close of 1885 the accounts of the colonial department of water supply stood as follows:

Amount of authorized loans.....	\$3,988,840
Amount paid to corporations.....	3,980,846
Cost of maintenance.....	447,971
Interest due.....	323,648
Revenue received to date.....	1,397,083
Principal of loans repaid.....	301,904

The season of irrigation for 1891 will probably see a great improvement. Several trusts will be able to deliver water. In 1892 about one-half of the twenty-five will do so. The total advances that will be made if they carry out their improvement will be only £1,158,000. The security will be 1,440,000 acres of land, worth without irrigation £4,000,000, with irrigation double that sum. The national works will cost about £1,000,000. The total expenditure, therefore, will be about £2,000,000 sterling. The colony has a revenue of £8,000,000. It has expended £30,000,000 on railways. The expenditure of £5,000,000 will reclaim land worth £11,000,000, covering about 3,000,000 acres.



Source of supply for Kern and Tulare district.

IN CALIFORNIA.

WHAT IRRIGATION HAS DONE FOR THIS STATE.

Wealth and Population Increased and Deserts Made Productive— Prospects for the Future.

Leaving out of consideration the first impetus given by the gold mining era to the growth of California, it may be asserted as a fact susceptible of ready proof that no other element has done more than the practice of irrigation to build up the wealth and population of this State, and in the future it is equally certain that nothing else will have so potent an effect in the same lines. So much greater are the returns from irrigated lands by comparison with those which are not supplied with water, and so capable are such lands of sustaining the densest population, that it is self-evident such must be the case. It is only through irrigation that land can be brought into the most highly productive state, and it is no exaggeration to say that the returns secured by the irrigating farmer are from 100 to 1000 per cent greater than the best efforts of the non-irrigator can obtain. So great are the rewards of the irrigator that a half dozen acres carefully cared for will yield a larger return than a couple of hundred acres farmed without irrigation. Much of the experience of irrigators in California is of so marvelous a character as to be almost incredible, and could indeed

scarcely be believed were not the accounts known to be absolutely correct.

Nothing can better illustrate the effects which irrigation has had upon the growth of California than a comparison of the condition of the State twenty years ago with the present status. Taking the census for the three last decades, the population was divided among the counties as follows:

-----	43		
-----	77—120		
-----	62		
-----	7		
-----	269		
Colleges are not required to announce the (Mining, Chemistry, or Engineering) they second year.			
BY CLASSES.			
	Science.	Letters.	Total.
-----	12	29	41
-----	18	16	34
-----	29	8	57
-----	20	47	67
-----	79	120	199
-----			69
-----			268

d some of the Special Course Students, are with some one of the Colleges. Many of



COUNTIES.	Population Census 1870.....	Population Census 1880.....	Population Census 1890.....
Alameda.....	24,237	62,972	93,516
Alpine.....	685	539	667
Amador.....	9,582	11,886	10,315
Butte.....	11,493	18,721	17,904
Calaveras.....	8,895	9,694	8,970
Colusa.....	6,165	13,118	14,616
Contra Costa.....	8,461	12,525	13,503
Del Norte.....	2,022	2,584	2,570
El Dorado.....	10,309	10,685	9,208
Fresno.....	6,336	9,478	31,877
Humboldt.....	6,140	15,510	23,424
Inyo.....	1,956	2,928	3,544
Kern.....	2,925	5,601	19,031
Lake.....	2,963	6,596	7,103
Lassen.....	1,327	3,840	4,144
Los Angeles.....	15,309	33,379	101,410
Marin.....	6,903	11,925	12,643
Mariposa.....	4,572	4,539	3,917
Mendocino.....	7,545	12,800	17,573
Merced.....	2,807	5,656	8,062
Modoc.....	.....	4,309	4,936
Mono.....	430	7,499	2,015
Monterey.....	9,876	11,802	18,653
Napa.....	7,163	13,235	16,304
Nevada.....	19,134	20,827	17,375
Orange.....	.....	.....	13,564
Placer.....	11,857	14,226	15,689
Plumas.....	4,439	6,180	4,916
Sacramento.....	25,830	34,591	40,508
San Benito.....	.....	5,594	6,390
San Bernardino.....	3,988	7,786	25,486
San Diego.....	4,951	9,618	34,878
San Francisco.....	149,478	239,953	297,980
San Joaquin.....	21,050	24,354	23,576
San Luis Obispo.....	4,772	9,142	16,179
San Mateo.....	6,635	8,669	10,054
Santa Barbara.....	7,784	9,522	15,730
Santa Clara.....	26,246	35,089	47,895
Santa Cruz.....	8,743	12,861	19,241
Shasta.....	4,172	9,492	12,109
Sierra.....	5,619	6,623	5,047
Siskiyou.....	6,843	8,010	12,150
Solano.....	16,871	18,425	20,485
Sonoma.....	19,819	25,926	32,691
Stanislaus.....	6,498	8,751	9,992
Sutter.....	5,090	5,159	5,465
Tehama.....	3,587	9,302	9,878
Trinity.....	3,213	4,998	3,635
Tulare.....	4,533	11,281	24,875
Tuolumne.....	8,159	7,848	6,028
Ventura.....	.....	5,073	10,066
Yolo.....	9,899	11,772	12,644
Yuba.....	10,651	11,270	9,536
Totals.....	569,247	864,686	1,205,397

The principal irrigation centers of the State are the counties of Los Angeles, San Diego, San Bernardino, Kern, Tulare, Fresno and Merced. In the twenty years from 1870 to 1890 the population of these counties will be seen to have increased at a far greater rate than any other of the interior counties. These figures are well worth studying:

	1870.	1890.
Los Angeles.....	15,309	101,410
San Diego.....	4,951	34,878
San Bernardino.....	3,988	25,486
Kern.....	2,925	10,031
Tulare.....	4,533	34,875
Fresno.....	6,336	31,877
Merced.....	2,807	8,162

The increase in wealth of the irrigating counties has been proportionate to their growth in population, and is in far greater proportion than the counties outside of the irrigating districts. The taxable wealth of the various counties in 1870, 1880 and 1890, as returned by the State Board of Equalization, is as follows:

COUNTIES.	Assessed Valuation.		
	1870.	1880.	1890.
Alameda.....	\$11,786,331	\$49,298,448	\$76,377,178
Alpine.....	378,604	366,699	292,349
Amador.....	2,241,070	2,872,387	4,132,337
Butte.....	3,484,014	12,988,004	18,591,862
Calaveras.....	1,089,787	2,608,316	4,255,875
Colusa.....	4,339,041	17,875,773	23,672,049
Con. Costa.....	2,802,657	8,170,523	14,995,426
Del Norte.....	454,902	820,250	1,888,936
El Dorado.....	2,143,941	2,909,732	5,560,850
Fresno.....	3,219,230	7,533,327	35,539,555
Humboldt.....	2,133,660	6,607,366	13,023,202
Inyo.....	630,259	1,177,362	1,958,853
Kern.....	1,974,856	5,852,881	10,380,154
Lake.....	801,201	2,556,274	3,775,995
Lassen.....	590,997	1,203,490	2,504,319
Los Angeles.....	6,918,074	18,502,632	67,121,610
Marin.....	3,583,449	8,924,530	10,653,349
Mariposa.....	1,137,498	1,465,243	1,891,467
Mendocino.....	2,523,732	6,573,983	11,905,080
Merced.....	3,202,455	6,441,416	13,368,921
Modoc.....	.....	1,833,058	3,882,115
Mono.....	516,176	2,365,439	483,431
Monterey.....	3,563,844	8,076,874	14,405,751
Napa.....	3,942,966	9,182,661	28,936,644
Nevada.....	5,871,066	9,061,990	5,109,145
Orange.....	.....	.....	9,018,748
Placer.....	4,063,639	7,999,343	8,195,404
Plumas.....	1,209,600	2,100,592	2,394,209
Sacramento.....	11,187,764	25,748,298	32,206,200
San Benito.....	.....	3,933,953	5,982,820
San Bernardino.....	1,202,482	3,650,746	1,081,295
San Diego.....	2,589,957	4,995,462	27,703,520
San Francisco.....	116,376,938	233,520,326	301,444,140
San Joaquin.....	7,833,229	27,463,315	36,496,107
S. L. Obispo.....	2,871,056	4,663,085	13,082,938
San Mateo.....	1,901,955	7,764,410	13,687,035
Sta. Barbara.....	2,832,526	5,487,053	14,792,623
Santa Clara.....	11,813,882	25,590,723	51,091,808
Santa Cruz.....	2,897,120	6,596,512	10,643,065
Shasta.....	1,146,112	2,813,577	5,036,723
Sierra.....	2,175,372	1,741,537	1,539,650
Siskiyou.....	2,154,210	3,724,857	5,307,354
Solano.....	6,945,725	12,121,576	18,281,502
Sonoma.....	6,923,006	18,802,853	28,833,942
Stanislaus.....	3,423,804	9,730,246	15,205,103
Sutter.....	2,406,295	5,202,790	9,271,775
Tehama.....	2,053,437	6,627,303	10,947,811
Trinity.....	536,161	1,093,939	1,186,555
Tulare.....	3,453,763	6,493,888	21,742,827
Tuolumne.....	1,153,224	1,976,572	3,890,540
Ventura.....	.....	3,831,979	7,051,253
Yolo.....	4,752,605	12,909,950	19,508,649
Yuba.....	3,986,505	5,035,252	6,670,340
Totals.....	.....	\$666,183,325	\$1,060,390,296

The seven leading irrigation counties showed the following remarkable increase for the twenty years covered:

	1870.	1890.
Los Angeles.....	\$6,918,074	\$67,121,610
San Diego.....	2,539,957	27,703,520
San Bernardino.....	1,202,482	22,490,440
Kern.....	1,974,856	10,389,154
Tulare.....	3,456,768	21,742,827
Fresno.....	3,219,230	35,539,555
Merced.....	3,202,455	13,368,921

It is safe to say that nine-tenths of this remarkable increase in wealth is due to the irrigation enterprises that have been carried out in the counties referred to.

The progress report recently issued by R. J. Hinton, special agent in charge of the irrigation investigation, contains a complete epitome of the present status of irrigation in this State, and it will be liberally quoted from. The information is of the most accurate character and cannot for a moment be suspected of any exaggeration.

The most astonishing development of the small farm and colony life which irrigation so rapidly tends to produce has been seen in California during the past ten years. What the effect may be upon

average holding in the State under the present census cannot now be estimated. In 1880, 500 acres was the amount per capita for California. Three years ago it was estimated at 300 acres. The development is not confined to Southern California, but has within the past four years or less manifested itself strongly throughout the State, except in some of the wheat-growing counties. It has reached its largest development so far within the most famed fruit-growing section. A land sale that took place quite recently in San Bernardino county illustrates the progress of the small farm. At this sale, conducted by a company which had constructed irrigation works in a field hitherto regarded as unpromising, over 8000 acres of land were disposed of at an average rate of \$66 34 per acre. Of this 2030 acres were in ten-acre lots, nearly 1400 acres in twenty-acre lots and the balance, except two lots of 700 and 170 acres, was in subdivisions of less than 100 acres each. The California purchasers, who know the advantage of compact village life and horticultural settlement, in every case contented themselves with the smaller tracts. This is an example on a little larger scale as to one enterprise of a great many that are going on all over Southern California and in the San Joaquin valley. These fruit-growing settlements are advertised by their promoters as colony enterprises. They are seldom, however, co-operative in character.

The great ranch system which grew up in the State out of the Spanish and Mexican plan of land holding, and of the railroad land-grant system, by which the Southern and Central Pacific roads have been created, has broken down of its own weight. Over 12,000,000 acres were till quite recently held almost unbroken under Mexican grants within the southern counties alone. Disintegration and division is in very rapid progress just now. During the past year in the counties of Merced and Kern, for example, the owners of great bodies of land and costly water systems have been actively engaged in promoting irrigation and in the sale of their land in small bodies for fruit farm purposes. In Merced county one of the principal holders of such land and water privileges asserted in 1889 that it was the owner's intention to hold on to the land in large bodies and cultivate it, either directly or by tenants, for wheat and other field crops. Since then the same interest has organized colonies in Holland and brought a considerable number of settlers therefrom, selling parcels of land to them of from 20 to 100 acres in extent. In that county alone there are now some ten of these community or colony enterprises under way. In Kern county, where the first California irrigation operations upon an extensive scale were begun and carried forward, the land and water owners interested have been for the last year actively promoting the sale and subdivision of their great estates. Four fruit colony settlements are already under way through their efforts. Three other colonies have been inaugurated in another portion of the county whose water supplies are obtained from an artesian basin of the most remarkable character. This basin is fed by

the drainage of the Sierras, the culminating point of which, Mount Whitney, lies directly to the east of its location.

In Tulare county, still the most extensive wheat-growing section of the San Joaquin valley and the State, a region in which but a few years since there appeared to be no room for horticulture, or even agriculture, upon a paying basis, there is now a growing and rapid division of the land into fruit-farm areas. The tendency throughout the whole region is in this direction—that of thickly settled communities, living in comfort and even in luxury upon very small bodies of highly cultivated land. In the western part, at Hanford, and along the eastern slope of the coast range, a section in which development has been heretofore very slow, there is now a rapidly growing increase of irrigation works and supplies. At Hollister and some other points in San Benito county large irrigation works are being established. Several land enterprises, divided into holdings of from ten to twenty acres, are in operation. In Ventura county the same tendency is also seen. In Santa Barbara, to a certain degree, small orchard holdings have long existed; but not until recently has the organization of horticultural communities as such obtained a foothold there. In the counties of Los Angeles, Orange, San Bernardino and San Diego the growth of fruit-farming communities has been a most notable feature of the last few years. It began with the success of Riverside, Pasadena, Pomona, and other of the older settlements. There are about 200 of these prosperous hives of comfort, fertility and beauty of surrounding within the boundaries of what is known as Southern California. These are not boom towns, but places in which much work and high cultivation have already secured success. San Diego county is now being developed under this plan of operations. All of these settlements owe their existing prosperity to the water supply, which enables them to irrigate lands otherwise arid.

The growth of population in California during the past decade will illustrate, not alone the economic importance of the cultivation of the soil by irrigation, but the social significance of the changes which such methods of cultivation tend rapidly to produce in farm life and habits. Under its influence striking changes are going on in the character of the State. During the past ten years California has gained at the rate of 39 per cent in population. The cause of that gain can be seen when it is known that thirteen counties of the State have lost in population from 1 to 73 per cent, while fifteen, including the most important irrigated areas, have grown more rapidly than the State at large. In the counties that have fallen back, mining, stock raising and lumber industries have been the principal support. In the fifteen counties that have grown so largely, farming pursuits under irrigation have become the chief feature of their development. The total population of the State in 1880 was 861,552. In 1890 it was 1,203,939. The gain in the eleven counties most deeply interested in irrigation has been over 753 per cent. The percentage is as follows:

County of—	Percent.
Fresno.....	238
Kern.....	79
Los Angeles.....	234
Merced.....	36
Orange.....	244
San Bernardino.....	227
San Diego.....	295
San Luis Obispo.....	77
Santa Barbara.....	86
Tulare.....	120
Ventura.....	98

These counties comprise those affected directly and indirectly by the growth of irrigation enterprises and horticultural progress. Taking the six counties of Southern California proper, to wit, Santa Barbara, Los Angeles, Orange, San Diego, Ventura and San Bernardino, the increase of population will be:

In 1830.....	64,379
In 1890.....	202,974

An increase for the decade of.....138,596

The counties in Northern and Central California which have maintained and increased their population will also be found to have been favorably affected by the tendency that irrigation has so developed.

Another evidence of the value of this form of farm life may be found in the banking statistics of California. There are 232 banks in the State. Of these twenty-eight are in San Francisco and sixty-three in the Southern counties. Putting aside the San Francisco bank statement, it appears that the sixty-three banks had on the first of July, 1890, of cash on hand, \$6,264,000; the remaining 141 banks, scattered over the State, held as cash in hand only \$9,265,000. The State at large shows \$26 in cash to each inhabitant. Southern California, however, shows \$31 to each one of its population. Leaving San Francisco and Southern California out of account, the average cash per capita elsewhere would be \$11. The deposits of the San Bernardino banks show an average of \$93 to each man, woman and child within the county. It is claimed that the property of the State will give an average of \$9000 to each family. These figures are presented in illustration of the remarkable tendency toward small farming which irrigation produces everywhere, and of the still more remarkable results as to security and prosperity which, under favorable circumstances as now developed, have followed its progress.

The value of irrigation as an economic factor in the cultivation of the soil is of the highest quality. The fact that the irrigating farmer has the elements and the seasons practically under his control is coming to be more generally understood all over the country. To illustrate the value of an irrigation supply: The semi-aridity of the great plains region, which has been a marked feature for several

years, has caused a loss of 20 per cent in its productions. If the fruit crops, then, of the arid States, especially California, were entirely dependent, as are the wheat crops of the plains region, upon the irregular natural water supply, the enormous loss that would follow can be easily appreciated when it is remembered that peach and apricot orchards, etc., return a net profit of at least \$100 per acre; the wine grape and the table grape one of \$150; the raisin grape from \$200 to \$250,

and oranges at least \$300 per acre. The loss of 20 per cent on such crops would reach a very large sum. Irrigation with such soils and under such circumstances makes production as certain as that of the weaver, the iron-molder or the shoemaker. The sunshine is there, the soils are filled with fertile elements, and the water, when stored above or below ground, made rich by nitrogen, microscopic fungi and other fertilizers drawn from earth and atmosphere, will, combined with the skill of the cultivator, rob agriculture of the uncertainty that has heretofore belonged to it as a pursuit.

It appears to be a well-founded fact that the water supply in Southern California has been in many places largely increased during the past few years. In some it has been more than doubled by artificial means, and this development is going on rapidly. The artificial progress is thus conclusively stated by one whose valuable experiences enforce his conclusions: The water supply during the past few years has been materially increased and in many places more than doubled by artificial means, and this development is going on to-day at a rapid rate.

First—The natural flow is being saved by the construction of conduits (pipes and cement canals), which save all the water in the streams and put it where it will do the most good.

Second—The natural flow of our streams is being increased by running tunnels under the beds of the streams to take the underflow which otherwise is lost.

Third—Artesian wells are being sunk in large numbers and large irrigation systems are being formed and an abundance of water is being obtained from this one source alone, which is adding millions to our wealth and thousands to our population.

Fourth—Storage reservoirs are being successfully built. There are at present three large reservoirs completed and filled with water. The first attempt was the Bear valley reservoir in San Bernardino county. It is a grand success, and no one can look into the future far enough to see the vast acreage that reservoir will eventually irrigate. The Cuyamaca and the Sweetwater reservoir in San Diego county were next completed, both of which are more than meeting the expectations of their promoters. The Hemet lake reservoir near San Jacinto and the San Luis Rey reservoir are both in process of construction, and others will follow. This shows the artificial increase of irrigating water.

The area available in the five counties of Southern California, not including what is known as the desert region, that may be cultivated for fruit by means of irrigation is not less than 2,000,000 acres. T. S. Van Dyke, of San Diego, divides these acres as follows:

County of—	Acres.
San Bernardino.....	300,000
San Diego.....	550,000
Los Angeles and Orange.....	600,000
Ventura.....	300,000
Santa Barbara.....	300,000

Total..... 2,050,000
Against Mr. Van Dyke's estimate Los Angeles claims a much larger area and credits San Diego with less, but between the authorities 3,000,000 acres may be

seen as the total reclaimable area. At an average profit of \$200 per acre for fruit and other special crops—which is rather below than above the yield of fruit lands in that section—the reclamation of the 3,000,000 acres alluded to would within five years make an annual return of \$600,000,000 to the income of the community. Mr. Van Dyke declares:

"The amount of land available in Southern California for the production of all kinds of fruit is a thing that few even of its oldest residents have any idea of. Every year sees thousands of acres of vineyard and orchard shining upon land that the year before every one supposed nature had designed only for brush or cactus. Every year sees thousands of vines and trees come into the full bearing of abundant and perfect fruit upon gravel and boulder washes, wastes of cobblestones, etc., that but three or four years ago the poorest seeker for a home on the public lands would not touch. So every year sees water brought higher and higher over the country, and thousands of acres which must have irrigation, and which with water are the most valuable parts of the whole, are being yearly reclaimed. Southern California is getting more water than ever before; is entering upon an era of water development that will cast the past into the shade. This is of far greater importance than the discovery of new land, for it is the irrigated sections that will produce the greatest amount of wealth, and maintain upon the market the highest standard of products."

The farm value of the fruit trees raised in the United States is not less than \$180,000,000. Our annual imports of fruits and nuts may be estimated at a value of \$20,000,000; just about the amount that France spends annually in aid of her agricultural development. Our total exports will not exceed one-tenth of our fruit imports. Or oranges we import not less than 1,750,000 boxes; of lemons, 2,275,000; of raisins, more than 2,000,000 boxes of twenty pounds each, and of figs, 8,000,000 pounds at least; the value of prunes imported cannot be less than \$800,000. The 3,000,000 acres of land which Mr. Van Dyke claims can be reclaimed in Southern California, alone will produce of the finest of fruits enough to wipe out the difference between our present exports and imports of such production. This fact alone is sufficient warrant for the practical interest manifested in the progress of irrigation. It is evident that California alone could supply all of the temperate and semi-tropical fruits and nuts that are now consumed in this country. Recent reports claim a commercial shipment for 1890 equal in value to \$10,000,000. Of prunes, 15,000,000 pounds; raisins, 40,000,000 pounds, and of oranges 4000 carloads have been shipped out of the State. Nor is this all of the benefit arising from special culture and intensive farming by means of irrigation. Our wine imports exceed in value \$7,000,000 annually, yet California has about 225,000 acres under wine-grape culture, and exports wine to Europe to be brought back and sold in our own markets as of French origin. The product for 1890 is estimated at 18,000,000 gallons. We can not only supply our own tables, but we can vastly increase that market by an increase of the fruit area. ¹⁸⁹⁰ can export

and compete with the best fruit countries of the world, and ere long we shall probably be found doing this successfully.

The question of general farm competition is settling itself. Take California, for example, as a wheat-growing State. Three years since California had nearly 2,800,000 acres, producing over 30,400,000 bushels. The past year the cereal crop was about 27,000,000 centals. The average value of the wheat product was \$7 50 per acre. The difference in favor of the Eastern farmers' contiguity to market is estimated at about 30 cents per bushel.

In an address before the State Horticultural Society N. P. Chipman declared that the yield per acre in California has fallen off at least 28 per cent within eighteen years. He estimates its average as below that of the United States as a whole. It is claimed therefore that to raise wheat for the world's market is comparatively unprofitable farming, and that fertility and production are alike diminishing. Forage plants, especially alfalfa, are much more valuable when combined with the raising of fine stock. But a very large proportion of the area devoted to wheat in California can profitably be transferred to fruit culture, with a difference in favor of the grower in net profits of from \$100 to \$300 per acre. In 1874 Vaca valley contained 4500 acres devoted to wheat and alfalfa. It is now planted to trees and produces an annual profit of nearly or quite \$200 per acre. Land worth \$60 in 1874 sold for \$600 in 1888. At Newcastle, in Placer county, among the foothills, wheat land worth five years since from \$5 to \$10 per acre is now selling for fruit-growing purposes at from \$100 to \$200 per acre. Wheat lands in Merced county, under ditch two years since, selling at from \$25 to \$40 per acre and renting for half these figures, are selling now for fruit purposes at from \$60 to \$150 per acre. At Bakersfield, Kern county, a similar change from alfalfa and wheat to vines and fruit trees has trebled the value of the land. In the whole San Joaquin valley the vineyards average but twenty-three acres each.

One of the most striking evidences of all this change under the magic touch of irrigation is that exhibited by Fresno county, in the center of the San Joaquin valley, California, especially that portion of it lying adjacent to Fresno city. In 1871 a colony of 500 persons settled there and laid out 5000 acres in small vineyards, for the purpose mainly of cultivating the muscat or raisin grape. This colony, begun on the 16th of February, 1871, is the most prosperous, with the exception, perhaps, of Riverside, now existing in California. The same settlers that bought and planted 5000 acres of land, paying \$2 50 per acre, became the supporters of the Fresno Canal and Irrigation Company, which then had a length of about forty miles of main and lateral ditches. In 1870 there were less than 5000 people; in 1890 there were over 100,000. There are 25,000 residents in and around Fresno city. More than twenty colonies, large and small, are located there, and 20,000 acres of vineyards are directly tributary to that place. In 1890 there were sixteen main canals in existence with a length of 750 miles. The laterals had about the same mileage, or 1500 miles in all. About 400,000 acres are under cultivation in the

county. The entire area would be worthless except for occasional crops of wheat and sparse cropping for cattle, without the advantage of the systems of irrigation in vogue. Their cost is estimated in 1890 at \$1,500,000. The acreage in cereals is given at 300,000, in grapes 60,000, in orchards 5000, in alfalfa 20,000; the remaining 7000 acres being utilized for small products. In 1870 the cultivated area would have been sold at a high figure if \$1,000,000 had been paid for it. It is probably worth \$80,000,000 at this time. The raising grape began to bear in 1873, and 6000 boxes of twenty pounds each were shipped that year. In 1883 2,800,000 pounds, or 140,000 boxes, were shipped from Fresno city. In 1890 the crop was over 1,000,000 boxes of twenty pounds each.

Land unimproved with water sells at the present time at from \$50 to \$100 per acre; improved and "under ditch" at from \$100 to \$300 per acre. The cost of water royalty is included in the land, which remains, therefore, inalienable from it. The annual cost of maintenance averages 62½ cents per acre. Within the year 1890 irrigation districts have been formed in Fresno county under the Wright laws, the bonds for the construction of which works are about to be issued. Under these laws the company and private works now in existence will be purchased or condemned, and be paid for out of the proceeds of the bonds. This system will result in a large increase of irrigable area.

In California horticulture is in great part the result of irrigation. This is especially true of the culture of citrus fruits, raisin grapes; to a large extent also of wine grapes and of the deciduous trees throughout Southern California. The fruits of the temperate zone and the culture of the prune—one of the largest fruit projects of the State—is accomplished, as a rule, without the direct application of water to the land on which the trees are grown. Natural sub-irrigation is but just being understood within the irrigable region as necessary for the successful cultivation of these fruits.

The commercial value, as well as other social and economic factors of crops grown under irrigation are forcibly illustrated by the results of fruit culture. In California generally horticulture is almost impossible without irrigation, natural or artificial. The prune grows to its greatest perfection in the coast region, where the surface is underlaid with water and the rainfall is abundant. The olive, fig, English walnut and other deciduous fruit trees flourish well, being irrigated only in their earlier years.

The raisin grape and the orange most forcibly illustrate the value of irrigation. That California could grow oranges to perfection was demonstrated by the Padres 100 years ago, but their actual production as a commercial factor began in Riverside in 1870. Then Riverside was but a sheep ranch. The largest land owner pleaded to have his taxes reduced to 75 cents per acre. Without irrigation Riverside and its neighbors would have no real value for their land. It took 800 acres to support a ranchman and twenty-five to poorly feed one head of cattle. Now 6,000 people live well on 6,000 acres. No land in America supports so well so many peo-

ple, and no locality has so many beautiful and striking features of landscape. Of this area 3,000 acres are in oranges, the oldest trees being 15 years old, while thousands are but just fruiting. In 1890, 1480 carloads of oranges and lemons were shipped to market, the value per car being \$800, or a total of \$1,184,000, a net return per acre of \$395. The area about Riverside is now about 12,000 acres. The entire population is not less than 8,000. There are 750,000 citrus trees owned and cultivated by 660 persons. Raising grapes occupy a large area, and, with other fruits, gave a return last year of \$700,000. A moderate estimate places the value of fruit shipped from Riverside last year at \$1,800,000, a larger estimate places it at \$2,500,000, which gives an average of over \$2,200,000, or \$300 per acre.

The original cost of the land upon which these valuable crops are raised it will be very difficult to estimate. It certainly does not exceed from first to last \$100 per acre, or \$1,200,000 in all. This does not include the cost of improvements by way of dwellings, etc., which must nearly double the value. The total cost of the works for the original settlement of Riverside will be about \$80 per acre, or, in round figures, \$500,000. For other works, pipes, pumps, canals and artesian wells, the total cost will be about \$1,100,000, making in all \$1,600,000 or a fraction over for the whole 12,000 acres embraced in the five Riverside settlements of \$100 per acre. The maintenance of the system is a comparatively small item. It may be seen by these statements, which are rather above than below the mark as to the cost of land and works, that two years' production at Riverside would return a profit of 15 per cent, at least, on the average totality of outlay. Of course the present values of land to the later purchasers and occupants give an entirely different balance sheet. Even with these high figures a large return is secured, as, for example, a purchase was made in the winter of 1889-'90 of a ten-acre orange orchard, all of which was in bearing; the cost of the land and trees to the purchaser was \$1000 per acre. The crops sold divided between two grades of oranges, one for \$1750 and the other for \$1250, making a return of \$300 per acre. Under this percentage of returns the purchaser of these ten acres would, inside of four years, receive \$2000 more than his original outlay. During the past year the yield from citrus orchards at Riverside ranged from \$1000 per acre down to \$261 80. These figures cover the net and not the gross profits, as the cost of cultivation, etc., are all deducted before the amounts are given. All these results are from the primary application of water by artificial means to the soil. Blessed by unremittent sunshine, by the clear dry atmosphere common to the arid country, with land that has gathered for untold centuries the fertilizing qualities of the rocks and soils round about, and manipulated also by an intelligent cultivation rarely to be found, the student of the new agriculture finds at Riverside abundant evidences of the benefits to be derived from irrigation and striking proofs of the fine social life that is being created by such conditions.

One of the most notable instances of the

effect which irrigation has upon land values and at the same time illustrating the remarkable results of intensive farming, made practicable only through irrigation, is afforded at Anaheim, which is justly called the parent of the colony system in California. Writing of this settlement some sixteen or eighteen years ago, the well-known traveler Charles Nordhoff gave a complete history of the project. In 1857 several residents of San Francisco of German descent proposed by united effort to purchase a piece of land, lay it out into small farms, plant these with grapes for wine, and to do all this by one general head or manager and in the cheapest and best manner possible. After some discussion fifty men joined to buy a tract of 1165 acres of land on the then uncultivated and apparently desert plain southwest of Los Angeles. The price paid was \$2 an acre, and included with the land was a right to water for irrigation. It may be added just here that much of this very land that originally cost but \$2 an acre is now worth at least \$2000, and cannot be bought even for that, paying as it does a high rate of interest upon such valuation. The members of the colony were workmen of almost every occupation except farmers. There were blacksmiths and brewers and musicians and merchants, but not a solitary farmer, in the company. None were in any sense well-to-do, none had money enough to purchase and improve even so small a tract, but they believed that by co-operation they could all better their condition to an extent impossible in San Francisco. The tract of 1165 acres was divided into fifty twenty-acre lots, while a village plot was laid out and divided into fifty lots, besides a number of lots for school and church purposes, etc. A competent manager was chosen and the members assessed themselves at first for just sufficient to pay for the land, which at \$2 an acre was no very heavy tax. This manager engaged a force of Indian laborers, and as the first step constructed an irrigating ditch some seven miles in length, taking water from the Santa Ana river in the mouth of the canyon, near the point now known as Yorba. Beside the main canal there were laterals or distributing ditches covering the entire tract and aggregating 450 miles in length. On each twenty-acre lot eight acres were planted with vines, and fruit trees were planted on the balance. For three years the manager continued to control the tracts. At the end of that time the trees and vines were bearing fair crops, and accordingly the colonists decided to take possession of their places. Each stockholder had at this time paid in \$1200, this sum representing the actual cost of each 20 acres. In dividing the property, however, premiums were paid for choice lots, so that when the whole matter was settled it was found that each colonist had paid an average of \$1080 for his small farm.

In summing up his account of the Anaheim colony, Nordhoff states that "the property which cost \$1080 is now worth from \$5000 to \$10,000." That was in 1874.

At the present time there are few of the original tracts that can be bought for less than \$1000 an acre, and for many of them even that amount would be no temptation. Briefly, with the aid of water the value of land has been advanced from 500 to 1000 per cent, and a veritable garden has been created from what was in fact a desert.

That the district system of irrigation will prove by far the most economical that can be devised a little examination will show. Take a hypothetical case under the Wright law: The laws provide 6 per cent on the bonds and twenty years for their repayment, with a call on the issues after ten years. Suppose, then, 100,000 acres are bonded at \$10 per acre, or \$1,000,000 in all. At the end of ten years \$600,000 will have been paid as interest. If the bonds are then called in at the rate of \$100,000 per year the entire debt will have been wiped out at a cost of interest of \$930,000, or with the total of obligation and repayment—a full payment—of \$1,930,000. This will be a tax or cost per acre of \$19 30. The average annual water rental paid to private companies will not be less than \$2 per acre, or \$40 on a capitalization of twenty years. In addition, every land-owner buying since water was brought to their land has paid an average royalty or bonus for the privilege of obtaining water of at least \$10 per acre. Under the district system no such bonus will be required. The debt obligation in some senses may be considered as taking its place, but all that is compensated for by the fact that the water belongs absolutely and in perpetuity to the land, and the price paid includes all the works also. The average cost of maintenance and service will at once, under the district system, be largely reduced. In most cases it will at once be placed at one-half, as there are no dividends to make, and in a few years the average annual cost will hardly be more than one-fourth of present rates, or say 50 cents per acre, where now \$2 is paid.

But the advantage is to be most clearly seen in the rapid growth of reclamation and increase in land values. For example, in any 100,000 acres embraced by an irrigation district in California probably less than one-fifth will be under cultivation by irrigation. The selling price of this area, if used for family crops only, will be about \$40 per acre. If used for deciduous fruit and vegetables it will reach an average of \$100 per acre. If for special crops, like wine grapes, prunes, etc., the value will be at least \$100 per acre. If for raisin grapes and citrus fruits it will certainly reach \$250, and probably more, per acre. Each acre of the 80,000 that is reclaimed will add largely to the selling value of every acre embraced in the 20,000 first cultivated, and a rapid doubling of values will be sure to follow, and that, too, within a comparatively short period.

The *Tulare County Times* makes some valuable estimates and comparisons on the district and private systems of irrigation as follows:

The 76 canal is now the property of Alta irrigation district, and its various



Headquarters on Alessandro tract.

branches will be extended so that all the lands in the district shall receive their quota of water. When the canal was in the hands of the original owners those desiring water were required to pay \$5 per acre for the privilege of obtaining, and an additional sum of 50 cents per acre per annum to keep the canal in repair. During the last two or three years of its existence the company had doubled on its rates as above given. But counting the figures as first given and allowing interest on the investment at the rate of 10 per cent it will be seen that in twenty years the farmer would have expended \$25 per acre for irrigating his land and at the end of that time would have no proprietary interest in the water of the canal. Simply the privilege of continuing to pay this price or any other sum the 76 company chose to collect for the next thirty years.

From Y. P. Baker, one of the directors of the Alta Irrigation district, the following figures were obtained, they being his estimate of the cost of irrigation to his people under the Wright irrigation law, viz: There are 130,000 acres of land in the district. Bonds have been sold to the amount of \$410,000 and it will require an additional \$60,000 to complete the water system, making a total cost of \$475,000. This is a debt of only \$3 65 per acre. The average yearly running expenses will be about 20 cents per acre, and the interest on the bonds about 22 cents per acre annually. Thus figured, this is an expense of only \$12 05 per acre in twenty years—less than one-half the price that would have been paid to the 76 company.

One of the most interesting questions is that of land values as produced by irrigation. The nature of the products raised under this system of farming and the in-

tensive culture which it generally demands have much to do, of course, with the large increase in the commercial value of land cultivated by this system as compared with contiguous areas and acres not "under ditch." The value of irrigation can well be tested by the evidences of profit. An examination of the evidence given by the witnesses before the United States Senate Special Committee on Irrigation and Reclamation of Arid Lands will show that in no case were the estimates of increased land values, as arising from the artificial application of water to the soil, less than \$2 to \$5 per acre over similar and adjacent land not "under ditch." Indeed the estimates generally run from \$15 increase up to \$250 per acre, and even more, for land not actually cultivated, but in a position to be made at once available by reason of its convenient access to water. These larger prices are, of course, the scale only of the semi-tropical or other exceptional areas, wherein fruits and special products of high marketable value are most readily produced.

But it will be found during the development of irrigation and the cultivation of the soil thereby that the area of special products, in its relation to the whole arid region, will enlarge almost continuously until the two become synonymous in character.

In California the small farm, fruit culture and their necessary intensiveness of culture have added greatly to the value of all arable land. Throughout the State unirrigated land commands from \$5 to \$50 per acre; and there have been many sales in excess of the larger figure. In Los Angeles county, at the mouth of the Cahuenga pass, unimproved land with a water right has sold at \$450 per acre; ordinary vine land, unirrigated, is worth \$40.

and farm land to \$30 per acre. Irrigation increases land values to \$150 and \$800 per acre.

In San Bernardino and Los Angeles counties the factors of values are far above the average and the prices generally equal thereto. In San Bernardino 8300 acres, with water right (uncultivated), were recently sold for \$556,000, or a small fraction over \$67 per acre; at Redlands five acres (cultivated) sold for \$7500, or an average of \$1500 per acre. In San Diego county farm lands are worth \$20 to \$100 per acre, while land for orchard and vineyard sells at \$250 to \$500 per acre. In Fresno grain land sells at from \$20 to \$50 per acre, and \$100 to \$300 per acre is paid for fruit land. In Butte county, Northern California, \$650 per acre is the highest price yet paid for orchard land. The average will be about \$400 per acre. Kern county lands run from \$5 to \$20 per acre for non-irrigated land. For farming purposes water increases this value to \$25 and \$40, and for horticulture to \$60 and \$100. Merced holds about the same average for non-irrigated and as high as \$75 for irrigated farms, and \$150 for fruit culture. In further illustration of the matter of land values and of the tendency which irrigation is rapidly producing, the accompanying table giving the details in regard to 1586 small farms is of great value:

Total acreage.	In vines. Acres.	In fruit. Acres.	Yield of Raisins. Tons.	Per acre in grapes. Tons.	Per acre in fruit.	Total value of yield.	Number of acres.	Yield per acre.
8	8	3	137	137	\$137	\$1,100	8	\$137.50
14	9	2 1/2	16	134	228	2,600	14 1/2	185.90
20	12	2	20	133	150	2,167	20	135.00
20	7	2	18	259	60	3,000	9	218.00
20	15	3	247	247	83	3,705	18	205.89
20	11	20	14	127	93	3,197	30	103.12
30	11	1	45	145	100	3,500	30	116.60
40	30	1	45	151	100	4,430	21	163.33
40	15	1	70	151	100	7,000	21	100.00
80	70	1	12	60	150	1,350	80	65.00
80	20	1	113	118	150	13,962	118	118.37

The difference in yield is, of course, due wholly to the various stages of growth in vine and tree.

Statements could easily be presented showing much larger values, and returns also, than the foregoing; statements indicate, but they are sufficiently moderate to be taken as a reliable basis for calculating

the returns from nearly all fruit land in California, except that devoted to citrus culture. The average net returns of wine and raisin grapes, prunes, and deciduous fruits generally when they are in a mature state will range from \$80 to \$200 per acre. The average net returns for matured orange and lemon orchards will not be less than \$350 when all conditions are fair. This is illustrated by the statements made in San Bernardino county as to the value of orange orchard land. The testimony of fifteen residents there, for example, sets the ordinary value of such land at \$300 to \$1500 per acre. These witnesses embrace viticulturists, merchants, real estate operators, a banker and an editor. The majority of them placed the selling value of such orchards at from \$800 to \$1000 per acre.

These estimates refer, of course, to the more improved areas of that section, but it is safe to estimate citrus lands with water and a growing orchard fairly located as selling at about \$400 per acre. Land which is not yet under water has recently sold at from \$60 to \$90 per acre, because it is adapted to fruit culture and will be served at no distant day with an abundant water supply. This rise in value is not confined to Southern California alone, though its effect is seen there in the most marked manner. It extends throughout the State. The difference everywhere is at least \$10 to \$1 in favor of the special product, the secure culture, and the small farm which irrigation brings over that of ordinary farming, even with the aid of water and within the arid region.

The enormous increase in values brought about through irrigation can be seen from the following statement of the assessed valuations of the four southern counties in 1880 and 1890. The actual values it must be borne in mind, are fully twice those given by the Assessor:

REAL ESTATE.		
	1880.	1890.
*Los Angeles.....	\$10,477,432	\$45,451,995
Orange.....	5,495,015	1,463,337
San Bernardino.....	1,639,007	12,990,005
San Diego.....	1,307,302	20,000,085
Totals.....	\$13,453,841	\$83,940,100

*Los Angeles in 1880 included Orange county.

IMPROVEMENTS.		
	1880.	1890.
*Los Angeles.....	\$3,033,053	\$14,253,300
Orange.....	1,463,337	1,463,337
San Bernardino.....	586,577	4,193,550
San Diego.....	341,948	24,560,286
Totals.....	\$3,961,584	\$24,560,473

*Los Angeles in 1880 included Orange county.

A cloud of witnesses as to the cause of this great prosperity may be cited, but one will do.

Charles Nordhoff, the well-known writer, says: "With water applied to the soil what wonders, what miracles, have been wrought in Southern California in a few years. I saw Riverside in the spring of 1872 when it was so dreary and desolate a spot that to my eyes and those of many others it seemed a hopeless desert waste. We all know what Riverside is now. Water judiciously applied produced that magnificent result, and in ten years made

a lovely and rich garden spot of what was originally a barren and most unpromising waste.

"I drove the length and breadth of the Fresno country in 1872, when even the cattlemen thought it too arid and desert for their cows; now it is one of the justly famous garden spots, rich with every product, from grain to raisin and other valuable fruits. The settlement * * * was largely by colonies.

"The colony plan, as it was called, was laughed at for a while in California. I have watched the development of several of the most noted experiments with careful interest, and I do not know of one in which the members held together for even eight or ten years without every man becoming comfortably independent."

In California, except as to the assessors' returns, no effort has ever been made to ascertain the extent of small, private irrigation works. The larger operations, being generally conducted by corporations, are better known. Considerable activity has been displayed for the past year and a half. Many extensions are in progress. New canals and other works are under way. Some of the larger ones will be indicated. The chief work, measured by area, to be reclaimed is that of the Bear Valley reservoir, in San Bernardino county. Its dams, pipe lines and tunnels are pieces of bold engineering. A brief sketch will be in order.

In 1880 it was believed that the interior valleys of Southern California would forever remain sterile, as there was not sufficient water to irrigate properly even a limited arable area. Among the many schemes of reclamation put under way the Bear Valley Reservoir is the most important. This plan was first projected in 1883, and after examining the valley, which had for outlet a narrow rock-bound gorge, it was determined that the building of a dam for reservoir purposes was entirely practicable. At the time of examination there was no water running in the canyon or in its stream bed. Taking the high-water mark of the valley, however, as a guide, it was believed that the reservoir would fill, and construction work was decided upon, notwithstanding the hostile general opinion to the contrary. A company was then organized and 3300 acres of land were purchased for the site. Gates were built and observations taken during the winter of 1883-84 of the precipitation, which was shown to be ninety-three inches over the watershed or drainage basin from which the reservoir was to fill. The fall in valleys below is barely one-seventh of this fall.

The fact was thus demonstrated that were a dam built of proper height 360,000 acre-feet of water could be stored, a supply sufficient to irrigate 360,000 acres of land on a basis of one inch to eight acres, or enough to irrigate for ten years every acre then cultivated in San Bernardino.

Another source of supply is from the Whitewater river, which comes down from the southern and eastern slope of Grayback and San Bernardino mountains by a canal around the eastern base of Mount Grayback, picking up all the mountain streams on that side of the range.

In 1884 the first dam was completed in the face of great difficulty and the reser-

voir permitted to fill gradually, until, in the month of April, 1886, the water began to run through the waste-weir. Since that time the reservoir has been constantly full. Its summer use is fully replenished in winter. The holding capacity is remarkable. The loss between maximum and minimum by evaporation and seepage is only between two and three feet, or less than if the whole area had been paved and cemented, proving that there is a large phreatic, that is, underflow or springs, supply, besides the natural surface drainage. The capacity of the first reservoir was about 36,000 acre-feet of water.

The next year and a half was spent in the amicable settlement of certain disputes about water rights, some important results of which were that a canal nine miles long was built due east from the mouth of the Santa Ana canyon along the foothills to Highlands, and vicinity. On the south side another canal was built in co-operation with another company. The dam now being considered is 20 feet at foundation base, 12 feet at top of foundation, 8 feet 6 inches at base of dam, 3 feet 2 inches at top and 60 feet high. It is of the arch type. Another branch of the system is a small reservoir on the Santa Ana river, where a dam of 150 feet high is being erected, completely stopping the flow of the Santa Ana and conserving every year, no matter how dry the winter, 12,000 acre-feet of water.

It is intended to build a new dam about 150 feet below the present one, where the sides of the gorge are more precipitous, to a height of 120 feet above the old datum plane, or 133 from base to top of the actual structure. This dam will also be of the crown-arch type—about 600 feet in the arc, 120 feet high, and stepped off in regular courses from base 73.70 feet thick to the parapet of about 11.55 feet. This formation, it is claimed, properly distributes the strains. At the center of the arc of the dam there is to be erected an outlet well, fitted with three outlet 36-inch pipes, capable of discharging 75,000 miners' inches of water. The lake to be formed by this dam will be twelve miles long, and is situated in townships 2 east and west, and ranges 1 east and west, and is twelve miles long by about a mile and a half wide. The amount of water stored will be 105,419,000,000 gallons, or larger than the ten greatest reservoirs of the United States. The waste-weir is situated at the end of the lake farthest from the dam.

The watershed of the combined Bear valley and Santa Ana reservoirs is 271 square miles, with an annual average precipitation of at least fifty-six inches. The whole area is densely covered with pine, cedar, live oak, and a heavy undergrowth, adding greatly to the possibilities of water storage by retarding the melting of the snow until late in the season, thus serving as natural reservoirs. The Bear valley system is expected to irrigate about 500,000 acres of land and furnish power for an immense amount of machinery. It can easily be imagined that this body of water, having a fall of 4500 feet in a few miles, if sent over turbine wheels at proper intervals, is capable of furnishing all the power the region served will ever demand.

The Ontario colony in San Bernardino county affords an instructive example of utilizing waste land and water. Messrs

Chaffey Bros., its organizers, determined to carry out a complete irrigation system to the extent of the water supply available; also to give to the community all modern conveniences and appliances and to charge such prices for land as would cover this cost. The site of the colony was selected on the sloping land from the foothills of the Sierra Madre mountains, giving a perpetual supply of water from the mountain snows in the summer and rain water from the lower slopes and hills in the cold months. The Southern Pacific Railroad bounds the land of the colony to the south, seven miles from the foothills, and has its station of Ontario in the middle of this boundary, thirty-six miles from Los Angeles, the principal market for the colony's produce.

The site selected has the elements for success as a colony—productive land in a suitable climate, and a good commercial position, with abundance of water. Water rights were secured, the land purchased, and, after a careful examination of other enterprises, it was decided to distribute the water by means of cement pipes over the whole tract divided into 10-acre lots, so that each lot should be supplied at the highest point. The main roads were also constructed. In accomplishing this the Chaffeyes spent about \$170,000 for these purposes:

Dam across channel.....	\$ 2,500
Masonry-lined channel and tunnel....	35,000
Laying 27 miles of cement pipes.....	45,000
Iron pipes for supply of township.....	10,500
Improving streets and tree-planting...	18,000
Station, college, and hotel improvements, etc.....	59,000
Total	\$170,000

A dam diverts the water from the channel, but a large quantity passes below the bed, to intercept which a tunnel 3000 feet

long was driven to cut across this drainage, and thus lead it into a masonry-lined channel 6000 feet long. The water is taken from this channel by the cement pipes, but it is intended to construct a reservoir in which to store the surplus water not required during the non-irrigating season, with which the pipes will then be connected. Several miles have been laid of four-inch lap-welded pipe for distribution purposes. Laminated wrought-iron pipe is now used. The water is delivered and measured from cement pipes by means of a vertical connection, at which point a valve is fixed. This consists of a cast-iron plate, with an aperture the size of the pipe in it and a groove for the valve to slide in. The valve is simply a plate of cast-iron, with a wrought-iron lifting rod.

The tunnel construction was decided upon after sinking experimental shafts across the valley and thereby ascertaining the existence of a subterranean flow of such force that a chip of wood or other substance could be carried across the bottom of the shaft.

The quantity of water used for irrigating by the pipe system is 500 acres per cubic foot of water per second. The value at Ontario of one cubic foot of water per second is estimated at \$40,000. The unit of measure is one-fiftieth of a cubic foot, or a miner's inch of water. The discharge of a stream for irrigating purposes is estimated for the midsummer period—

that is, from the 15th of July to the 1st of August, when it is at its lowest.

Some of the boldest projects for the storage and diversion of water have had their origin in Southern California. The supply of water in running streams is so completely utilized at present that the only available means for increasing the amount for irrigation is in the construction of storage reservoirs. The Bear valley project and its remarkable success has already been described. In the same range of mountains another enterprise of similar character is now under way, which possesses unique features of interest.

In March, 1890, Charles J. Perkins, a well-known citizen of San Bernardino, and A. H. Koebig, city engineer of the latter city, conceived the idea of utilizing four large reservoir sites convenient to each other, lying about eleven miles north of the city of San Bernardino and on the north side of the Sierra Nevada range, bounding the valley of San Bernardino on the north. These reservoir sites are great valleys or plateaus lying at an elevation of 5000 to 7000 feet. Their areas are from 180 to 375 acres each, and at an elevation of about 400 feet above the other. The plan of these gentlemen was to construct dams at the gorges of each of these reservoir sites and store the great storm waters falling there annually, as well as convey in a canal the waters of the South Fork of the Mojave river, and connecting each reservoir with a canal or pipe line, one with the other.

At the lower reservoir, known as the Huston Flat, the water is to be conducted into a canal about a half a mile in length, thence into a tunnel 4500 feet in length, running through the saddle of the range of mountains; thence into the Waterman canyon, allowing the waters to flow down that canyon about one mile, and then in a pipe line along the crest of the west side of Waterman canyon about two miles, where a fall of 1000 feet is obtained for utilizing the water for electric-power purposes. It is estimated by Colonel Anderson, the State Engineer of Ohio, and Mr. Koebig that there will be sufficient water-fall for 4000 electrical horse-power delivered at the cities of San Bernardino, Redlands, Colton and Riverside; thence the water is to be conveyed in a pipe line or canal in a westerly direction toward the Grapeland Irrigation district, Etiwanda, Pomona and the famous Chino ranch.

Surveying parties were kept in the field for nearly one year by Messrs. Perkins and Koebig before they attempted to draw the attention of capital to their enterprise. In February, 1891, the whole scheme was mapped out in a systematic manner and laid before a number of capitalists of Cincinnati, among whom were Colonel Anderson, State Engineer; Adolph Wood, a banker, and Dr. Erhman, an eminent physician, after which these gentlemen visited California and made an examination of the plan and project, and, after a thorough investigation, purchased the property of them, and are now in the field at work with engineers preparatory to issuing proposals for the erection of two dams, a 4500-foot tunnel and twelve miles of pipe line. The cost of this enterprise, when completed, will be over \$750,000, and the amount of water for irrigation purposes



Main section Turlock canal.

will exceed 10,000 inches per annum. It is estimated that the revenue derived from the waters furnished to irrigators will equal a 10 per cent annual dividend on \$2,000,000.

According to the statements submitted to the Senate committee in 1889, the irrigation "plant" of the State comprised the following:

Miles of ditches.....	3833
Cost per mile.....	\$640 to \$5400
Total cost.....	\$10,375,289
Acres of irrigated areas—	
Farm Crops.....	3,081,000
Vines.....	83,000
Fruit.....	131,000
Total.....	3,294,000

The areas of vines and fruit, it is needless to say, are grossly underestimated.

In Kern county a remarkable degree of development is in progress, and the fruit colonies under way in the neighborhood of Bakersfield, Poso and Lerdo have laid out a large acreage for future cultivation. One most striking enterprise is in the northeastern section of Kern county, where three fruit colonies have been established, the water supply for which is found in the powerful artesian basin now being developed therein. In San Diego county there has been a steady increase in the area and service of several great enterprises established therein during the last two years. The acreage of fruit as well also as of grain farming has largely increased. Small areas have been brought under irrigation by wells and small phreatic supplies. In both San Bernardino and Los Angeles counties there has been a steady growth during the past years of numerous small irrigation areas served by local supplies, chiefly underground. One of the most interesting developments is being made in Inyo county—a region of high

altitude, lying between parallel ranges of the Sierras. In other mountain counties, as Lassen and Sierra for example, considerable progress has been made. In Lassen it is seen in utilizing as reservoirs of natural storage basins. In Sierra county the development of an artesian supply of water is referred to. In Shasta, in the extreme northern part of the State, irrigation enterprises for fruit cultivation are under way, while elsewhere in the foothills region considerable activity and interest have been manifested; progress to a considerable extent is reported.

In further illustration of the effects of irrigation are presented the following summaries of the "taxable values" of California for 1879 and 1889, as summarized from the Senate committee's report:

	1879.	1889.	Increase.
13 southern counties enriched by irrigation.....	\$102,516,231	\$350,981,695	\$248,465,414
11 other counties wherein irrigation increases.....	47,791,104	99,336,095	51,544,991
8 foothill counties partially irrigated.....	23,739,268	36,397,142	12,657,874
Total.....	\$174,046,655	\$486,714,932	\$312,668,279

The increase in the balance of the State, twenty-one counties, amounted in 1889 over 1879 to \$192,125,578, or \$56,297,836 less than in the first division given.

The discoveries and utilizations already made give good reason to hope that springs and artesian water may be found in considerable volume throughout the Mojave and over a considerable portion of the beach lines and other portions of the Colorado trough or basin.

The reclamation of the Algerian desert

offers lessons of value in this direction. There waters are restored to the surface after percolating for an immense distance; here the stream beds are numerous, and the courses of their buried waters within the area to be reclaimed are easily ascertainable. Railroads have crossed the barren waste without experiencing great difficulty in obtaining water, and indeed in many places the water is so near the surface that the coyotes, as at Coyote Wells, are known to have reached it. The chief difficulty in the way of a copious supply of water in the Colorado desert is found in the fact that quicksand is liable to choke the well bores or other appliances.

Antelope valley is a part of the region known as the Mojave desert. In 1882 the Southern Pacific Railroad Company bored an artesian well at Lancaster in the northern part of Los Angeles county and obtained a good supply of water. Flowing water was no sooner found than settlement began, wells were bored, cultivation and improvements put under way; and from this section of the Mojave desert, whose aridity has been so notorious, the wheat was harvested in the summer of 1890 that took the prize at the county fair over the competition of all Southern California.

In this valley, which is rather a portion of a wide intra-mountain plain, forming part of the vast drainage basin which once fed a great inland gulf that now heads into a shallow delta some 300 miles below and is slowly but steadily receding, as well as in the upper and narrow portion of the Colorado desert, irrigation has already created the beginning of large and prosperous fruit-growing settlements. In the Antelope valley proper since April, 1889, some 10,000 acres have been brought under cultivation. This area can be readily increased to 25,000 acres. It is estimated that in all 50,000 acres are now under ditch. The surface supply is obtained from mountain streams, stored in three reservoirs, with a total capacity of 30,000,000 gallons. The works include 5 dams, 5 headways, 7 weirs and 6 tunnels driven into the foothills. The main ditches are 50 miles in length, 5 feet wide at the top. There is an equal mileage of distributing and lateral ditches. Five artesian wells, besides that of the railroad at Lancaster, have been sunk to depths of from 180 to 500 feet, with a flow for each ranging from 50,000 to 200,000 gallons per 24 hours. The economic service of their waters is equal to a duty of 7000 acres. Over 100 wells are in use. They range from 20 to 100 feet in depth. They draw their supplies from the glacial drift of gravel and boulders.

In view of the extension of reclamation by irrigation over large portions of the desert region, now arid and unproductive, it may be as well to suggest in outline some of the products which, by the aid of unflinching sunshine, a tonic atmosphere and water intelligently applied, can be as surely manufactured from the arid soils as the wool from the sheep can be sheared, washed, carded, spun and woven into cloth. Not only can the grains and sugar cane, roots and other vegetables, with the trees and shrubs of the semi-tropics, be brought to maturity in great abundance, but all of the citrus and

deciduous fruits and berries of the same regions. Not these only, but the commercial, leguminous and medicinal products of Mexico, etc., may be successfully cultivated. The date, as a fruit, will require careful study in the more elevated portions. But the indigenous date palm of the Colorado desert and lower river valley yields a fruit which, in spite of entire neglect, is still palatable, and may yet, by hybridization, become of commercial value. A great industry that can be created is that of the cultivation of the olive, with the preparation also of its various merchantable products.

DISTRICTS FORMED.

Organizations That Have Been Effected Under the Wright Law.

There have been some thirty-three districts organized in the State so far under the provisions of the Wright law. Several others are in process of formation, while of those named a number have not taken any definite action as yet.

The Alessandro district is situated in San Bernardino county and comprises some 25,000 acres of land lying in what is known as the San Jacinto valley. The petition for the organization of this district was presented to the Board of Supervisors on December 1, 1890, and there being no objection it was granted, and on January 3, 1891, the election was held. The following directors were chosen: S. C. Freefield, C. T. Gifford, F. M. Townsend, A. J. Condee and W. T. Warner. George H. Kelsey was chosen secretary. The water for this district was obtained from the Bear valley reservoir, bonds to the amount of \$765,000 having been issued and transferred in payment for the same. The works have been constructed and the water is now being delivered on some 4000 acres of the district which have been put under cultivation within the last three months. From the commencement to the close, this district has been admirably conducted, and everything has been carried out successfully. It affords one of the best examples of the value of water that can be found in the State. Prior to the organization of the district and the discovery of a feasible source of supply, this land was slow or almost impossible of sale at from \$5 to \$10 an acre. As soon as it was learned that water could be obtained the price went to \$50, and now that water has been put on the land, the selling price is \$100 to \$150 an acre. Yet the water cost but \$30 an acre, and there are twenty years in which to pay for it.

The Citrus Belt district is in San Bernardino county and was organized in September, 1890. There are 12,160 acres within its limits and the amount of bonds voted was \$800,000. These have been exchanged for water rights and canal and pipe lines, the source of supply being Lytle creek and a series of artesian wells of good capacity. The amount of bonded indebtedness of this district is \$65 78 per acre. At present lands in this district may be purchased for \$75 to \$100 an acre.

The East Riverside district adjoins the famous Riverside settlement in San Bernardino county. It was organized

in September, 1890, and includes but 3000 acres of land within its boundaries. Bonds to the amount of \$250,000 have been issued and exchanged for a pipe line and artesian wells which provide an abundance of water. Owing to the expensive character of the work and the small size of the district the average cost to each acre is \$83.33. The land thus provided with water, however, sells readily for from \$300 to \$500 an acre unimproved, while without water it was worth nothing in point of productiveness. For years it was neglected vacant Government land, while at the same time lands immediately adjacent, but supplied with water, were selling at \$200 and more per acre.

The Grapeland district is in San Bernardino county and adjoins the Citrus Belt district on the north. It embraces 10,737 acres and was organized in June, 1890. Bonds to the amount of \$200,000 have been voted, and their proceeds will be devoted to the construction of an irrigation system. The water will cost an average of \$18.54 an acre, which is a remarkably favorable showing by contrast with districts deriving their supply from the same source and is a guaranty that the bonds issued will be a first-class security.

The Rialto district adjoins the Citrus Belt on the south, and comprises 7200 acres of land in the heart of the San Bernardino valley. It was organized in October, 1890, and bonds to the amount of \$500,000 were issued and exchanged for water rights and pipe lines. The supply of water is derived from Lytle creek and artesian wells. The bonded indebtedness is \$69.44 an acre, and lands in the district are selling for \$75 to \$100 an acre.

The Perris district is one of the healthiest in the southern part of the State. It comprises 22,690 acres and was organized in June, 1890. Bonds to the amount of \$412,000 were voted, of which a little over half were exchanged for water from Bear valley, and the proceeds of the remainder will be devoted to piping the water throughout the district. This district affords another remarkable instance of a rise in values simply on the belief that water could be obtained. Before there had been any talk of organizing a district, a tract of several thousand acres had been sold on foreclosure at Riverside, and the best bid that could be obtained was \$4.50 an acre. Not many months subsequently the project of obtaining water from Bear valley was found to be feasible, and on the strength of the first preliminary steps to that end the very same men who were not willing to pay more than \$4.50 an acre stepped forward and quickly bought up all the land they could obtain at \$35 to \$40 an acre, and the same land is now selling for \$80 to \$100.

Big Rock Creek district is located in Antelope valley, Los Angeles county, and comprises 30,400 acres. It was organized in July 1890, and bonds were voted to the amount of \$400,000. Of these \$150,000 were exchanged for water rights, while so much of the remainder as may be necessary will be devoted to the extension of the canal system.

The Anaheim district in Orange county, comprising 32,500 acres, is one of the best in the State. Bonds to the amount of \$600,000 have been voted and of this amount \$150,000 has been devoted to the purchase

of the water rights and canals of the Anaheim Union Water Company. So much of the balance as may be needed will be used to extend the system over lands not yet irrigated. This is one of the oldest irrigated settlements in the State, and by the application of water land values have risen from a few cents to several hundred dollars an acre. Examination will show that the bonds of this district are one of the best investments that could possibly be found.

The Central district of Colusa county is another solid organization. This was one of the first districts organized under the Wright law, the date of the petition being October 10, 1887. In November, 1887, the election was held, resulting in an overwhelming vote in favor of irrigation. There are 156,550 acres in this district, and bonds to the amount of \$750,000 were voted, of which a large amount have been sold and the proceeds applied to the construction of irrigation works. The work is now well under way, and will be completed in due time. The organization of this district has been passed upon favorably by the Supreme Court, and its bonds are now beyond challenge.

Kraft district is another Colusa county organization, dating in December, 1888. It comprises 13,500 acres, and \$80,000 in bonds have been voted, but have not been issued. Stony Creek is the proposed source of supply for this district.

The Tulare district of Tulare county was organized in August, 1889, and comprises 34,150 acres. The district is bonded for \$500,000, and a large amount of bonds have been sold, the proceeds having been devoted to the construction of works which are well under way. The source of supply is the Kaweah river, and this district is one of the healthiest in the State.

The Poso district was organized in September, 1888, and comprises 43,000 acres in Kern county. It is bonded for \$500,000, and \$250,000 worth of bonds have been sold. The source of supply is Poso creek, and considerable work has already been done on the canal system. There are several natural reservoir sites, and when these are utilized water will be available to supply at least 100,000 acres. The cost per acre is but \$12.50, which makes the bonds of this district a first-class security.

The Kern and Tulare district is situated in the counties of those names and comprises 80,000 acres of land. Organization was effected in May, 1890, and bonds to the amount of \$200,000 were voted. It is proposed to derive a supply of water from Kern river.

The Madera district is located in Fresno county and embraces 305,000 acres of land, which has been bonded for \$350,000. The preliminary work has been done looking to obtain a supply of water, and the prospects of the district are very encouraging. The cost of putting water on the lands of this district is estimated at \$2.78 an acre, which with one exception is the lowest in the State.

The Alta district is located in Fresno and Tulare counties, and comprises some 130,000 acres. It was organized in July, 1888, and is bonded for \$675,000. Bonds to the amount of \$415,000 have been exchanged for a canal system, which will be extended so as to cover all the lands in the district.

The Modesto district, in Stanislaus

county, comprises 81,500 acres of land, and was organized in July, 1887, being, therefore, one of the first to take advantage of the Wright law. Bonds to the amount of \$800,000 have been voted, of which \$400,000 have been sold, the proceeds being devoted to construction works. Some important litigation has taken place here, but the district has been invariably victorious.

The Turlock district of Stanislaus and Merced counties has the honor of having been the first organized under the Wright law. The election was held on April 23,

1887, and the organization was completed in July of the same year. There are 173,346 acres in the district, and it is bonded for \$600,000, of which \$320,000 have been sold. The source of supply is the Tuolumne river, and the canal work is now well under way. Some very important legal points have been raised in connection with this district and have been passed upon by the courts, invariably in the support of the irrigators.

The San Jacinto and Pleasant Valley district has been recently organized at Winchester, San Diego county, and comprises some 20,000 acres. Only the preliminary formalities have so far been complied with.

A number of other districts are under discussion in various portions of the State, but are still in an incomplete condition.

IN THE ARID REGION.

Work Done in Other States and Territories.

While California was the pioneer in irrigation enterprise in this country, the example here set has been extensively followed elsewhere. Great irrigation schemes have been set on foot and carried out in Colorado, Idaho and other of the far Western States and Territories, and from the progress made in the past decade it is not too much to predict that if the same ratio of advancement be kept up it will be but a comparatively short period before the major portion of the great arid region will have been reclaimed.

The most recent statistics upon the subject of irrigation outside of California are furnished by R. J. Hinton of the National Agricultural Department in his last progress report.

Colorado has shown a great deal of activity in the construction of ditches and by an increase of the acreage to be served. This increase was especially manifested in Southeastern Colorado in the valley of San Luis and in the western and north-western portions of the State. The estimates made by the Senate committee in 1889 of the area under water and cultivated are as follows:

STATEMENT FURNISHED SENATE COMMITTEE BY
PROFESSOR L. G. CARPENTER AND STATE
AGRICULTURAL COLLEGE, 1889.

Number of water divisions.....	6
Number of water districts.....	44
Acres under ditch.....	2,913,273

Estimate of United States Geological Survey, 692,539 acres irrigated.

Since that date about 750,000 acres have been added to the area under water. The totals according to the admirable summing up of Professor L. G. Carpenter, whose statement is given in this report, are as follows:

Square miles.....	6,256.89
Acres under ditch.....	4,004,009
Acres irrigated.....	1,585,000

The mileage of canals reported to the State Engineer's office is 6,316.89. This does not include a considerable mileage of small ditches within the mountain valleys which are not reported nor recorded; the total within the State of mileage, adding these, is estimated at 8000. The total cost of the reported works is given by Professor L. G. Carpenter at \$10,950,000. This does not include a number of reservoirs constructed during the past year, nor the cost of the 2000 and more wells that have been sunk in the valley of the San Luis. The total in the whole State of irrigation works cannot therefore be less than \$13,000,000.

Great activity has been displayed in portions of the new State of Idaho. The Senate Committee on Irrigation, and the Governor of the late Territory, in his last annual report, made a statement as to irrigation works, areas under water and cultivation, mileage of canals, etc. The totals are given for the thirteen counties in which irrigation prevails:

Number of completed ditches.....	1,311
Miles of completed ditches.....	2,418

Acres irrigated and under ditch in 1889.....	715,500
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Acres that can be reclaimed, estimated.....	7,141,400
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Less than one-half of the area under ditch is actually cultivated. Governor (now United States Senator) George L. Shoup, in his last report as executive of the Territory, presents a statement and table from A. D. Foote, civil engineer, of Boise City—a most competent authority—which gives the following totals for 1890:

Area now irrigated (that is cultivated).....	337,000
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Area to be irrigated when projected works now constructing are completed.....	1,181,500
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Area irrigable with proper water supply.....	5,046,500
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Reservoir sites, capacity in acre-feet of water.....	4,780,000
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††The estimate of the United States Geological Survey for 1889 is as follows:

Area irrigated and under ditch.....	400,000
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Area under ditches, constructed and projected.....	740,000
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During the past year it may be fairly estimated that 100,000 additional acres have been brought under ditch, 35,000 of which have been brought under cultivation, while new works in progress in Southern Idaho, in Bingham county, and in the Boise valley will soon add several hundred thousand acres to the area under ditch.

The Territory of New Mexico is developing quite rapidly. The principal direction of settlement is to the Maxwell grant, in the northern section, along the central portion of the Rio Grande valley, into the Mesilla valley, and especially in that of the Rio Pecos. Large works are under way at different points in the Rio Grande and in the lower part of the Pecos, where, especially, a railroad is just finished, and other reservoirs and additional canals are rapidly approaching completion. There is a population there in all of about 20,000. Two years since there was not one-fourth of that number. All of the works projected and constructing in New Mexico promise to be of the most substantial character.

Under recent inquiry made by various Government agents, the following are presented as the best figures obtainable for 1890:

	Acre.
Total arable area of Territory.....	36,183,000
Total reclaimable area of Territory with present works.....	1,962,342
Total acreage under ditch and irrigated.....	593,315
For Eddy, Chaves and Lincoln counties, at least, may be added as now "under ditch".....	184,000

Or a total under ditch and irrigated of..... 677,315

In Arizona the actual increase of acreage by irrigation has been moderate. The Senate committee's report presented the following table of areas under ditch and cultivated:

ESTIMATED BY THE SENATE COMMITTEE FROM TESTIMONIES GIVEN IN 1889.

Number of counties reported.....	8
Number of canals reported and estimated.....	203
Number of miles.....	740½
Acres under ditch.....	529,200

REPORT OF THE UNITED STATES GEOLOGICAL SURVEY, ESTIMATED BY F. H. NEWELL, C. E.

Number of counties.....	10
Acres under ditch.....	455,600
Acres under irrigation.....	175,000
Acres cultivated.....	203,080

The acting Governor, in his annual report to the Secretary of the Interior, under date of September, 1890, gives the following totals:

Areas under ditches, in acres.....	587,460
Areas actually irrigated, in acres.....	295,200
Miles of canals.....	845¾

These are estimates made in the acting Governor's report for 1890. The Governor estimates the total area reclaimable at 5,550,000. Lieutenant Glassford, United States Signal Service, and others, estimate it as high as 10,000,000 acres. Captain George M. Wheeler, E. C., put the possible area at 25 per cent, or over 20,000,000 acres. The latest estimates given, gathered by Government agents, are as follows:

Acres under ditch.....	669,440
Acres to be reclaimed by works in progress.....	243,000
Miles of ditches.....	1,084¾
Miles of ditches in construction.....	300

The development has mainly been in the slow progress of enterprises that were already under way when the year began; in the reorganization or consolidation of enterprises; in the establishment of several colony movements—one of which is described elsewhere in this report; and in the growing evidence of the capacity of large areas within this Territory adapted to the production of the finest variety of semi-tropical fruits and vines. There is

no doubt that the ensuing year will see a more definite policy and a more determined effort, in Southern and Central Arizona at least, to inaugurate irrigation for the cultivation of the soil on a large scale. The prosperity of the Salt river valley is an ample inducement to that end and an argument for its success.

In Montana the Senate committee report for 1889 gives an area under ditch of 986,000 acres; actually about 350,000. Considerable activity has prevailed, and with the increased area of cultivation the total will reach at least 400,000 acres. Work in progress and partly constructed will make 1,100,000 acres a not unreasonable estimate for the area under ditch.

The area reported (1889) in Wyoming under ditch by the Territorial engineers was as follows:

Number of recorded ditches.....	2,349
Number of unrecorded ditches.....	466
Number of miles in ditches.....	4,249
Total carrying capacity in miners' inches.....	33,475
Total of acres served.....	1,946,876

The area cultivated may be estimated at 8 per cent, or about 160,000 acres. The increase in 1890 in cultivated area (beyond forage plants and pasture) will not be less than 15,000 acres, making in all 175,000. No increase in ditches or mileage is reported.

The Black Hills in South Dakota is at present the only section irrigated by surface works; the area under ditch is estimated at 100,000 acres and that under cultivation at about 20,000 acres. Elsewhere small experiments by artesian wells reached an area of about 2000 acres, and have clearly demonstrated the possibilities of that supply. In Western Kansas, Nebraska and Texas some increase in area of cultivation and a large addition to that "under ditch" has been noted. The estimates are as follows:

	Under ditch.		Cultivated 1890.
	1889.	1890.	
Western Kansas.....	300,000	350,000	120,000
Western Nebraska.....	50,000	65,000	10,000
Western Texas.....	210,000	340,000	160,000

The area indicated as cultivated is, of course, largely used for forage plants, as well as cereals and roots.

The figures, when summed up, present the totals that follow. This office, says Mr. Hinton of the Agricultural Department, has been scrupulous in its endeavors to obtain exact statistics. That it has not yet been as successful as is desirable is due to inability to send agents out and to the fact that the States and Territories, with the exception of Colorado and Wyoming, have not as yet made any direct effort to secure a full account of the important interest under review. Probably from this date, however, this difficulty may not be met with, as in addition to the systematic efforts making under law by the department through this office the United States Census Office has also made a minute inquiry.

LANDS UNDER DITCH IN THE ARID AND SEMI-ARID REGION.

States.	Acreage under ditch.		Cultivation, 1890
	1889.	1890.	
Arizona*.....	529,200	643,450	310,100
California.....	3,294,000	4,044,000	3,444,000
Colorado.....	2,813,273	4,004,009	1,585,000
Idaho.....	715,500	1,181,500	327,000
Kansas (western).....	500,000	360,010	100,000
Montana.....	986,000	1,100,000	400,000
Nebraska (westn).....	50,000	65,000	10,000
Nevada.....	142,000	150,000	75,000
New Mexico.....	638,455	677,315	450,000
Oregon (easter).....	75,000	100,000	45,000
S. Dakota (B. Hills).....	100,000	100,000	20,000
Elsewhere in Dak.....		2,000	2,000
Texas.....	200,000	340,000	160,000
Utah.....	700,000	700,000	413,000
Wyoming.....	1,946,876	1,946,876	175,000
Wyoming (east).....	75,000	150,000	60,000
Totals.....	12,764,304	16,064,160	7,576,100

*In Arizona for 1890 two estimates were sent in, one of 587,460 acres under ditch, and 295,200 cultivated acres, by the acting Governor;

the other, by Government officers, of 899,410 acres under ditch and 325,000 cultivated. The figures above are the mean of the two estimates.

It may safely be assumed that there are very many small irrigated areas scattered throughout the arid region which are not included in these estimates. There are also larger areas, not many in number, perhaps, in which the use of water for irrigating natural and cultivated grasses is of considerable importance. No estimate is attempted of the small irrigations of house gardens, lawns and fruit trees, which prevail in every city, town and village west of the ninety-seventh meridian. Altogether it will not be unreasonable that the area actually cultivated in 1890 reaches at least 8,000,000 acres.

It will be difficult to state in figures and acres the actual amount of irrigation progress accomplished in the semi-arid and arid States during the year 1890. The conflicting discussion of this subject has had, of course, to some extent, the effect of delaying investment. It had, however, one more beneficial, in that it has created a great interest in the whole subject. This has been manifested in a large variety of ways, causing, wherever there was no land policy to intervene, a very considerable degree of preparatory activity, whose effect will be seen during the ensuing year. The report of the Senate Committee on Irrigation presented the following tabulated estimate of the actual and approximate areas under ditch (1889) within the region of its investigation:

original investigations upon important by the several courses of study pursued good opportunity for stating, in a clear

	Under Ditch.	Irrigated.
	Acres.	Acres.
Arizona.....	455,000	225,000
California.....	4,000,000	3,300,000
Colorado.....	3,000,000	1,600,000
Idaho.....	715,000	500,000
Kansas.....	300,000	75,000
Montana.....	986,000	350,000
Nebraska.....	50,000	5,000
Nevada.....	142,000	70,000
New Mexico.....	800,000	625,000
Oregon.....	191,000	150,000
South Dakota (Bl. Hills)	100,000	15,000
Texas.....	200,000	125,000
Utah.....	700,000	413,000
Washington.....	75,000	50,000
Wyoming.....	1,947,000	75,000

Totals.....13,061,000 7,578,000

The estimates for 1889, made by the U. S. Geological Survey, were as follows:

	Acres.
Area under ditch, constructed and projected.....	9,974,419
Area under ditch and irrigated.....	8,307,000

The largest activity has prevailed during the past year in the States of California, Colorado, Idaho and Montana. In the territories of Arizona and New Mexico there has been some considerable progress made. In portions of South Dakota and in western Nebraska and Kansas the necessities of the people as well as the discussion that has arisen have crystallized into practical channels various projects and forms of enterprise that are likely to be of great service in the near future. The beginning of great activity has already been indicated in Washington and Oregon east of the Cascade range, while in Nevada there is a growing feeling that the security and maintenance of their State organization depends upon the efforts that are to be made in the direction of reclamation.

IRRIGATION DISTRICTS.

The following table shows a list of the irrigation districts of the State—thirty-three in number—their location, names and postoffice addresses of their secretaries; acreage, amount of bonds voted and sold, and the cost of supplying water per acre:

NAME OF DISTRICT.	COUNTY.	SECRETARY.	ADDRESS.	No. of Acres.	Bonds Voted.	Bonds Sold.	Bonds Per Acre.
Alessandro...	S. Bernard'no	G. H. Kelsey..	Moreno.....	25,500	\$765,000	\$765,000	\$30 00
Citrus Belt...	S. Bernard'no	D. A. Barras...	Colton.....	12,160	800,000	800,000	65 78
E. Riverside...	S. Bernard'no	J. A. Vanarsdale	Colton.....	3,000	250,000	100,000	83 33
Grapeland...	S. Bernard'no	E. T. Myers...	Grapeland...	10,787	200,000	None	18 54
Rialto.....	S. Bernard'no	D. Robinson...	Colton.....	7,200	500,000	500,000	69 44
Elsinore.....	San Diego...	W. H. Towns'nd	Elsinore.....	11,300	None	None	.....
Escondido...	San Diego...	A. J. Werden...	Escondido...	12,814	450,000	None	35 12
Fallbrook...	San Diego...	G. A. Scott...	Fallbrook...	12,000	.....	.....	.....
Murietta...	San Diego...	J. C. Mason...	Murietta...	15,000	None	None	.....
Perris.....	San Diego...	H. A. Plimpton	Perris.....	22,680	442,000	252,000	25 00
Spring Valley	San Diego...	.....	.....	22,000	None	None	.....
Big Rock Ck	Los Angeles	Ira Carter.....	Llano.....	30,000	400,000	50,000	13 10
Montrovia...	Los Angeles	.....	.....	.....	.....	.....	.....
Orange Belt...	Los Angeles	F. P. Frey.....	Pomona.....	4,500	200,000	None	44 44
Palmdale...	Los Angeles	C. W. Dolenhoff	Palmdale...	50,000	175,000	None	3 50
Vineland...	Los Angeles	I. N. Rhodes...	Vineland...	4,500	50,000	50,000	11 11
Dehesia.....	Los Angeles	.....	.....	.....	.....	.....	.....
Anaheim.....	Orange.....	B. V. Garwood	Anshelm...	32,500	600,000	None	18 46
Orland's Side	Colusa.....	L. P. Behrens...	Orland.....	25,000	100,000	None	4 00
Central.....	Colusa.....	R. de Lappe...	Maxwell...	153,550	750,000	286,000	4 78
Kraft.....	Colusa.....	J. W. Rogers...	Orland.....	13,500	80,000	None	5 93
Colusa.....	Colusa.....	.....	.....	130,000	600,000	None	6 00
Tulare.....	Tulare.....	E. Oakford...	Tulare.....	34,149	500,000	150,000	14 64
Poso.....	Kern.....	J. E. Anderson	Spottiswood	40,000	500,000	250,000	12 50
Kern & Tulare	Kern & Tulare	J. O. Siderner.	Delano.....	80,000	700,000	None	10 56
Madera.....	Fresno.....	E. H. Cox.....	Madera.....	305,000	850,000	None	2 78
Alta.....	Fresno, Tulare	G. H. Weaver.	Dinuba.....	129,927	675,000	416,000	5 19
Sunset.....	Fresno, Tulare	M. McWhorter	Selma.....	365,400	.....	.....	.....
Selma.....	Fresno, Tulare	W. L. Chappell	Selma.....	271,000	None	None	.....
Modesto.....	Stanislaus...	.....	.....	81,500	800,000	142,000	9 81
Turlock.....	Stan & Merced	R. M. Williams	Ceres.....	176,210	600,000	422,500	3 40
Brown's Val.	Yuba.....	J. McFarlane...	Brown's Val.	43,000	110,000	100,000	2 56
Pleasant Val	San Diego...	W. P. Milliken	San Jacinto.	20,000	.....	.....	.....
Totals.....	.....	.....	.....	2,106,775	11,197,000	\$4,289,500	\$8 04

THE WRIGHT LAW.

TEXT OF THE ORIGINAL BILL AND AMENDMENTS.

The Act Under Which Irrigation Districts Are Organized and Bonds Issued.

Several years ago it became apparent that some definite legislation upon the subject of irrigation was a necessity in order that the development of the State might not receive a setback. So much litigation had taken place in regard to water rights and the laws had been construed in so many ways that something radically different from any system then in vogue was demanded. The outgrowth of this necessity was the bill known as the Wright Irrigation law, which was introduced into the Legislature of 1886-87 by C. C. Wright of Modesto, and was passed through both houses and signed by the Governor. Since then the law has been amended upon several points, and as now on the statute books it is appended.

District Irrigation Law of California.

AN ACT

To provide for the organization and government of irrigation districts and to provide for the acquisition of water and other property, and for the distribution of water thereby for irrigation purposes, approved March 7, 1887, as amended in 1889 and 1891.

SECTION 1. Whenever fifty or a majority of the holders of title, or evidence of title, to lands susceptible of one mode of irrigation from a common source, and by the same system of works, desire to provide for the irrigation of the same, they may propose the organization of an irrigation district, under the provisions of this act, and when so organized such district shall have the powers conferred, or that may hereafter be conferred, by law upon such irrigation districts. The equalized county assessment roll next preceding the presentation of a petition for the organization of an irrigation district, under the provisions of this act, shall be sufficient evidence of title for the purposes of this act. (Amendment approved March 20, 1891.)

The section before amendment read as follows:

SECTION 1. Whenever fifty or a majority of freeholders owning lands susceptible of one mode of irrigation from a common source, and by the same system of works, desire to provide for the irrigation of the same, they may propose the organization of an irrigation district under the provisions of this act, and when so organized such districts shall have the powers conferred, or that may

hereafter be conferred, by law upon such irrigation districts.

SEC. 2. A petition shall first be presented to the Board of Supervisors of the county in which the lands, or the greatest portion thereof, is situated, signed by the required number of holders of title, or evidence of title, of such proposed district, evidenced as above provided, which petition shall set forth and particularly describe the proposed boundaries of such district, and shall pray that the same may be organized under the provisions of this act. The petitioners must accompany the petition with a good and sufficient bond, to be approved by the said Board of Supervisors, in double the amount of the probable cost of organizing such district, conditioned that the bondsmen will pay all said costs in case said organization shall not be effected. Such petition shall be presented at a regular meeting of the said board, and shall be published for at least two weeks before the time at which the same is to be presented in some newspaper printed and published in the county where said petition is presented, together with a notice stating the time of the meeting at which the same will be presented; and if any portion of such proposed district lie within another county, or counties, then said petition and notice shall be published in a newspaper published in each of said counties. When such petition is presented the said Board of Supervisors shall hear the same and may adjourn such hearing from time to time, not exceeding four weeks in all; and on the final hearing may make such changes in the proposed boundaries as they may find to be proper, and shall establish and define such boundaries; provided, that said board shall not modify said boundaries so as to except from the operation of this act any territory within the boundaries of the district proposed by said petitioners, which is susceptible of irrigation by the same system of works applicable to the other lands in such proposed district; nor shall any lands which will not, in the judgment of the said board, be benefited by irrigation by said system be included within such district; [provided, that any person whose lands are susceptible of irrigation from the same source may, in the discretion of the board, upon application of the owner to said board, have such lands included in said district. Said board shall also make an order dividing said district into five divisions, as nearly equal in size as may be practicable, which shall be numbered first, second, third, fourth and fifth, and one director, who shall be a freeholder in the division and an elector and resident of the district, shall be elected by each division; provided, that if a majority of the holders of title or evidence of title, evidenced as above provided, petition for the formation of a district, the Board of Supervisors may, if so requested in the petition, order that there may be either three or five directors, as said board may order, for such district, and that they may be elected by the district at large.] Said Board of Supervisors shall then give notice of an election to be held in such proposed district, for the purpose of determining whether or not the same shall be organized under the provisions of this act. Such notice shall describe the boundaries so established and shall designate a name for such proposed district, and said notice shall be published for at least three weeks prior to such election in a newspaper published within said county; and if any portion of such proposed district lie within another county or counties, then said



"Brookhurst"—Residence of F. G. Ryan, Anaheim

notice shall be published in a newspaper published within each of said counties. Such notice shall require the electors to cast ballots, which shall contain the words, "Irrigation District—Yes," or "Irrigation District—No," or words equivalent thereto, and also the names of persons to be voted for to fill the various elective offices hereinafter prescribed. No person shall be entitled to vote at any election held under the provisions of this act unless he shall possess all the qualifications required of electors under the general election laws of this State. (Amendment approved March 20, 1891.)

The amendment to this section is that portion contained in the brackets above. Before the amendment the amended portion read as follows: "Provided, that any person whose lands are susceptible of irrigation from the same source shall, upon application of the owner to said board, be entitled to have such lands included in said district. Said board shall also make an order dividing said district into five divisions, as nearly equal in size as may be practicable, which shall be numbered first, second, third, fourth and fifth, and one director shall be elected from each district."

The amendment to this section was made at the instance of small districts where the division of a district into five divisions and the election of a director from each was found to be attended with great inconvenience and unnecessary expense in holding elections, etc.

Sec. 3. Such election shall be conducted, as nearly as practicable, in accordance with the general laws of the State; provided, that no particular form of ballot shall be required. The said Board of Supervisors shall meet on the second Monday next succeeding such election, and proceed to canvass the votes cast thereat, and if upon such canvass it appear that at least two-thirds of all the votes cast are "Irrigation District—Yes," the said board shall, by an order entered on its minutes, declare such territory duly organized as an irrigation district, under the name and style theretofore designated, and shall declare the persons receiving, respectively, the highest number of votes for such several offices to be duly elected to such offices. [And no action shall be commenced or maintained, or defense made affecting the validity of the organization, unless the same shall have been commenced or made within two years after the making and entering of said order.] Said board shall cause a copy of such order, duly certified, to be immediately filed for record in the office of the County Recorder of each county in which any portion of such lands are situated, and must also immediately forward a copy thereof to the clerk of the Board of Supervisors of each of the counties in which any portion of the district may lie; and no Board of Supervisors of any county includ-

ing any portion of such district shall, after the date of the organization of such district, allow another district to be formed including any of the lands in such district, without the consent of the board of directors thereof; and from and after the date of such filing the organization of such district shall be complete, and the officers thereof shall be entitled to enter immediately upon the duties of their respective offices upon qualifying in accordance with law, and shall hold such offices, respectively, until their successors are elected and qualified. For the purposes of the election above provided for the said Board of Supervisors must establish a convenient number of election precincts in said proposed district, and define the boundaries thereof, which said precincts may thereafter be changed by the board of directors of such district. [In any district the board of directors thereof may, upon the presentation of a petition therefor, by a majority of the holders of title or evidence

of title of said district, evidenced as above provided, order that on and after the next ensuing general election for the district there shall be either three or five directors, as said board may order, and that they shall be elected by the district at large, or by divisions, as so petitioned and ordered; and after such order such directors shall be so elected.] (Amendment approved March 20, 1891.)

The portions included in brackets in this section are the new matter.

Sec. 4. An election shall be held in each district on the first Wednesday in February, 1893, and on the first Wednesday in February in each second year thereafter, at which an assessor, a collector and a treasurer and a board of directors for the district shall be elected. The person receiving the highest number of votes for any office to be filled at such election is elected thereto, and shall hold office from the first Tuesday in March next after for two years, and until his successor is elected and qualified. Within ten days after receiving their certificates of election, hereinafter provided for, said officers shall take and subscribe the official oath and file the same in the office of the board of directors, and execute the bond hereinafter provided for. The assessor shall execute an official bond in the sum of \$5000, and the collector an official bond in the sum of \$20,000, and the district treasurer an official bond in the sum of \$50,000; each of said bonds to be approved by the board of directors; and each member of said board of directors shall execute an official bond in the sum of \$5000, which said bonds shall be approved by the Judge of the Superior Court of

said county where such organization was effected, and shall be recorded in the office of the County Recorder thereof, and filed with the secretary of said board. All official bonds herein provided for shall be in the form prescribed by law for the official bonds of county officers. (Amendment approved March 20, 1891.)

The amendments to this section changed the time of holding elections for the election of officers from the first Wednesday in April in even numbered years, to the first Wednesday in February in odd numbered years, and by reason of the failure to hold an election in April, 1892, the officers elected in April, 1890, retain their offices until March, 1893. By the amendment the bonds of the directors and the assessor are reduced to \$5000.

Sec. 5. Fifteen days before any election held under this act, subsequent to the organization of any district, the secretary of the board of directors shall cause notices to be posted in three public places in each election precinct, of the time and place of holding the election, and shall also post a general notice of the same in the office of said board, which shall be established and kept at some fixed place to be determined by said board, specifying the polling places of each precinct. Prior to the time for posting the notices, the board must appoint for each precinct, from the electors thereof, one inspector and two judges, who shall constitute a board of election for such precinct. If the board fail to appoint a board of election, or the members appointed do not attend at the opening of the polls on the morning of election, the electors of the precinct present at that hour may appoint the board, or supply the place of an absent member thereof. The board of directors must, in its order appointing the board of election, designate the house or place within the precinct where the election must be held.

Sec. 6. The inspector is chairman of the election board, and may:

First—Administer all oaths required in the progress of an election.

Second—Appoint judges and clerks, if, during the progress of the election, any judge or clerk cease to act. Any member of the board of election or any clerk thereof may administer and certify oaths required to be administered during the progress of an election. The board of election for each precinct must, before opening the polls, appoint two persons to act as clerks of the election. Before opening the polls each member of the board and each clerk must take and subscribe an oath to faithfully perform the duties imposed upon them by law. Any elector of the precinct may administer and certify such oath. The polls must be opened one hour after sunrise on the morning of the election and be kept open until sunset, when the same must be closed. The provisions of the Political Code concerning the form of ballots to be used shall not apply to elections held under this act.

Sec. 7. Voting may commence as soon as the polls are opened and may be continued during all the time the polls remain opened, and shall be conducted nearly as practicable in accordance with the provisions of chapter 9 of title 2 of part 3 of the Political Code of this State. As soon as the polls are closed the judges shall open the ballot-box and commence counting the votes; and in no case shall the ballot-box be removed from the room in which the election is held until all the ballots have been counted. The counting of ballots shall in all cases be public. The ballots shall be taken out, one by one, by the inspector or one of the judges, who shall open them and read aloud the name of each person contained therein and the office for which every such person is voted for. Each clerk shall write down each office to be filled, and the name of each person voted for for such office, and shall keep the number of votes by tallies as they are read aloud by the inspector or judge. The counting of votes shall be continued without adjournment until all have been counted.

Sec. 8. As soon as all the votes are read off and counted a certificate shall be drawn up on each of the papers containing the poll list and tallies, or attached thereto, stating the number of votes each one voted for has received and designating the office to fill which he was voted for, which number shall be written in

figures and in words at full length. Each certificate shall be signed by the clerk, judge and the inspector. One of said certificates, with the poll list and tally paper to which it is attached, shall be retained by the inspector and preserved by him at least six months. The ballots shall be strung upon a cord or thread by the inspector during the counting thereof in the order in which they are entered upon the tally list by the clerks, and said ballots, together with the other of said certificates, with the poll list and tally paper to which it is attached, shall be sealed by the inspector in the presence of the judges and clerks, and indorsed "Election Returns of (naming the precinct) Precinct" and be directed to the secretary of the board of directors, and shall be immediately delivered by the inspector, or by some other safe and responsible carrier designated by said inspector, to said secretary, and the ballots shall be kept unopened for at least six months, and if any person be of the opinion that the vote of any precinct has not been correctly counted he may appear on the day appointed for the board of directors to open and canvass the returns, and demand a recount of the vote of the precinct that is so claimed to have been incorrectly counted.

Sec. 9. No list, tally paper or certificate returned from any election shall be set aside or rejected for want of form if it can be satisfactorily understood. The board of directors must meet at its usual place of meeting on the first Monday after each election to canvass the returns. If, at the time of meeting, the returns from each precinct in the district in which the polls were opened have been received the board of directors must then and there proceed to canvass the returns; but if all the returns have not been received, the canvass must be postponed from day to day until all the returns have been received, or until six postponements have been had. The canvass must be made in public, and by opening the returns and estimating the vote of the district for each person voted for, and declaring the result thereof.

Sec. 10. The secretary of the board of directors must, as soon as the result is declared, enter in the records of such board a statement of such result, which statement must show:

First—The whole number of votes cast in the district [and in each division of the district].

Second—The names of the persons voted for.

Third—The office to fill which each person was voted for.

Fourth—The number of votes given in each precinct to each of such persons.

Fifth—The number of votes given in each division for the office of director, and the number of votes given in the district for the offices of assessor, collector and treasurer.

The board of directors must declare elected the persons having the highest number of votes given for each office. The secretary must immediately make out and deliver to such person a certificate of election, signed by him and authenticated with the seal of the board. In case of a vacancy in the office of Assessor, Collector or treasurer, the vacancy shall be filled by appointment of the board of directors. In case of a vacancy in the office of director the vacancy shall be filled by appointment by the Board of Supervisors of the county where the office of such board of directors is situated from the division in which the vacancy occurred. An officer appointed as above provided shall hold his office until the next regular election for said district, and until his successor is elected and qualified. (Amendment approved February 16, 1889.)

The portions included in brackets are new matter, and the portion included in the bracket in the fifth subdivision is substituted in place of the words "the district to each of such persons."

Sec. 11. On the first Tuesday in March next following their election the board of directors shall meet and organize as a board, elect a president from their number and appoint a secretary [who shall each hold office during the pleasure of the board.] The board shall have the power, and it shall be their duty, to manage and conduct the business and affairs of the district; make and execute all necessary contracts; employ and appoint such agents, officers and employees as may be required, and prescribe their duties; establish equitable by-laws, rules and regulations for

the distribution and use of water among the owners of said lands, and generally to perform all such acts as shall be necessary to fully carry out the purposes of this act. The said by-laws, rules and regulations must be printed in convenient form for distribution in the district. And it is hereby expressly provided that all waters distributed for irrigation purposes shall be apportioned ratably to each landowner upon the basis of the ratio which the last assessment of such owner for district purposes within said district bears to the whole sum assessed upon the district; provided, that any landowner may assign the right to the whole or any portion of the waters so apportioned to him. (Amendment approved March 20, 1891.)

The time of the organization of the board is changed by this amendment from the first Wednesday in May to the first Tuesday in March, to correspond with amendment to section 4.

Sec. 12. The board of directors shall hold a regular monthly meeting in their office on the first Tuesday in every month, and such special meetings as may be required for the proper transaction of business; provided, that all special meetings must be ordered by a majority of the board. The order must be entered on record, and five days' notice thereof must, by the secretary, be given to each member not joining in the order. The order must specify the business to be transacted, and none other than that specified must be transacted at such special meeting. All meetings of the board must be public, and three members shall constitute a quorum for the transaction of business; but on all questions requiring a vote there shall be a concurrence of at least three members of said board. All records of the board shall be open to the inspection of any elector during business hours. The board and its agents and employees shall have the right to enter upon any land to make surveys, and may locate the necessary canals, and the necessary branches for the same, on any lands which may be deemed best for such location. Said board shall also have the right to acquire, either by purchase or condemnation [for other legal means], all lands, and waters and water rights, and other property necessary for the construction, use, supply, maintenance, repair and improvements of said canal or canals and works, including canals and works constructed and being constructed by private owners, lands for reservoirs for the storage of needful waters and all necessary appurtenances. In case of purchase the bonds of the district hereinafter provided for may be used at their par value in payment; and in case of condemnation the board shall proceed, in the name of the district, under the provisions of title 7 of part 3 of the Code of Civil Procedure. Said board may also construct the necessary dams, reservoirs and works for the collection of water for said district, and do any and every lawful act necessary to be done that sufficient water may be furnished to each landowner in said district for irrigation purposes. The use of all water required for the irrigation of the lands of any district formed under the provisions of this act, together with the rights of way for canals and ditches, sites for reservoirs and all other property required in fully carrying out the provisions of this act, is hereby declared to be a public use, subject to the regulation and control of the State in the manner prescribed by law. (Amendment approved March 20, 1891.)

The following sentence in the law before amendment read as follows: "The board, and its agents and employees, shall have the right to enter upon any land in the district to make surveys, and may locate the line for any canal or canals, and the necessary branches for the same, on any of said lands which may be deemed best for such location." The words in italics were stricken out and the words in brackets inserted.

Sec. 13. The legal title to all property acquired under the provisions of this act shall immediately and by operation of law vest in such irrigation district, and shall be held by such district in trust for and is hereby dedicated and set apart to the uses and purposes set

forth in this act. And said board is hereby authorized and empowered to hold, use, acquire, manage, occupy and possess said property as herein provided.

Sec. 14. The said board is hereby authorized and empowered to take conveyances or other assurances for all property acquired by it under the provisions of this act, in the name of such irrigation district, to and for the uses and purposes herein expressed, and to institute and maintain any and all actions and proceedings, suits at law or in equity, necessary or proper in order to fully carry out the provisions of this act, or to enforce, maintain, protect or preserve any and all rights, privileges and immunities created by this act, or acquired in pursuance thereof. And in all courts, actions, suits or proceedings the said board may sue, appear and defend, in person or by attorneys, and in the name of such irrigation district.

Sec. 15. For the purpose of constructing necessary irrigating canals and works, and acquiring the necessary property and rights therefor, and otherwise carrying out the provisions of this act, the board of directors of any such district must, as soon after such district has been organized as may be practicable, and whenever thereafter the construction fund has been exhausted by expenditures herein authorized therefrom, and the board deem it necessary or expedient to raise additional money for said purposes, estimate and determine the amount of money necessary to be raised, and shall immediately thereafter call a special election, at which shall be submitted to the electors of such district possessing the qualifications prescribed by this act, the question whether or not the bonds of said district in the amount as determined shall be issued. Notice of such election must be given by posting notices in three public places in each election precinct in said district for at least twenty days, and also by publication of such notice in some newspaper published in the county where the office of the board of directors of such district is required to be kept, once a week for at least three successive weeks. Such notices must specify the time of holding the election, the amount of bonds proposed to be issued; and said election must be held and the result thereof determined and declared in all respects as nearly as practicable in conformity with the provisions of this act governing the election of officers; provided, that no informalities in conducting such an election shall invalidate the same, if the election shall have been otherwise fairly conducted. At such election the ballots shall contain the words "Bonds—Yes," or "Bonds—No," or words equivalent thereto. If a majority of the votes cast are "Bonds—Yes," the board of directors shall cause bonds in said amount to be issued; if a majority of the votes cast at any bond election are "Bonds—No," the result of such election shall be so declared and entered of record. And whenever thereafter said board in its judgment deems it for the best interest of the district that the question of issuance of bonds in said amount, or any amount, shall be submitted to said electors, it shall so declare of record in its minutes, and may thereupon submit such questions to said electors in the same manner and with like effect as at such previous election. Said bonds shall be payable in gold coin of the United States, in ten series, as follows, to wit: At the expiration of eleven years, 5 per cent of the whole number of said bonds; at the expiration of twelve years, 6 per cent; at the expiration of thirteen years, 7 per cent; at the expiration of fourteen years, 8 per cent; at the expiration of fifteen years, 9 per cent; at the expiration of sixteen years, 10 per cent; at the expiration of seventeen years, 11 per cent; at the expiration of eighteen years, 13 per cent; at the expiration of nineteen years, 15 per cent; at the expiration of twenty years, 16 per cent; and shall bear interest at the rate of 6 per cent per annum, payable semi-annually, on the first day of January and July of each year. The principal and interest shall be payable at the place designated therein. Said bonds shall be each of the denomination of not

less than \$100 nor more than \$500; shall be negotiable in form, signed by the president and secretary, and the seal of the board of directors shall be affixed thereto. Each issue shall be numbered consecutively as issued, and the bonds of each issue shall be numbered consecutively, and bear date at the time of their issue. Coupons for the interest shall be attached to each bond, signed by the secretary. Said bonds shall express on their face that they were issued by authority of this act, stating its title and date of approval, and shall also state the number of the issue of which such bonds are a part. The secretary shall keep a record of the bonds sold, their number, the date of sale, the price received, and the name of the purchaser. In case the money raised by the sale of all bonds issued be insufficient for the completion of the plan of canal and works adopted, and additional bonds be not voted, it shall be the duty of the board of directors to provide for the completion of said plan by levy of assessments therefor. It shall be lawful for any district which has heretofore issued bonds under the law then in force to issue in place thereof an equal amount of bonds in accordance with this amendment, and to sell the same, or any part thereof, as hereinafter provided, or exchange the same, or any part thereof, with the holders of such previously issued bonds which may be outstanding, upon such terms as may be agreed upon between the board of directors of the district and the holders of such outstanding bonds; provided, that said board shall not exchange any such bonds for a less amount in par value of the bonds received. All of such old issue in place of which new bonds are issued shall be destroyed whenever lawfully in possession of said board. (Amendment approved March 20, 1891.)

Such important changes were made in the above section by the amendment that it is deemed best that the entire section, as it stood before amendment, should be recited. It read as follows:

Sec. 15. For the purpose of constructing necessary irrigating canals and works, and acquiring the necessary property and rights therefor, and otherwise carrying out the provisions of this act, the board of directors of any such district must, as soon after such district has been organized as may be practicable, estimate and determine the amount of money necessary to be raised, and shall immediately thereupon call a special election, at which shall be submitted to the electors of such district possessing the qualifications prescribed by this act, the question whether or not the bonds of said district shall be issued in the amount so determined. Notice of such election must be given by posting notices in three public places in each election precinct in said district for at least twenty days, and also publication of such notice in some newspaper published in the county, where the office of the board of directors of such district is required to be kept, once a week for at least three successive weeks. Such notices must specify the time of holding the election, the amount of bonds proposed to be issued, and said election must be held and the result thereof determined and declared in all respects as nearly as practicable in conformity with the provisions of this act governing the election of officers; provided, that no informalities in conducting such an election shall invalidate the same, if the election shall have been otherwise fairly conducted. At such election the ballots shall contain the words "Bonds—Yes," or "Bonds—No," or words equivalent thereto. If a majority of the votes cast are "Bonds—Yes," the board of directors shall immediately cause bonds in said amount to be issued; said bonds shall be payable in gold coin of the United States in installments as follows, to wit: At the expiration of eleven years not less than 5 per cent of said bonds; at the expiration of twelve years not less than 6 per cent; at the expiration of thirteen years not less than 7 per cent; at the expiration of fourteen years not less than 8 per cent; at the expiration of fifteen years not less than 9 per cent; at the expiration of sixteen years not less than 10 per cent; at the expiration of seventeen years not less than 11 per cent; at the expiration of eighteen years not less than 13 per cent; at the expiration of nineteen years not less than 15 per cent; and for the twentieth year a percentage sufficient to pay off said bonds; and shall bear interest at the rate of 6 per cent per annum, payable semi-annually on the first day of January and July of each year. The principal and interest shall be payable at the office of the treasurer of the district. Said bonds shall be each of the denomination of not less than \$100 nor more than \$500;

shall be negotiable in form, signed by the president and secretary, and the seal of the board of directors shall be affixed thereto. They shall be numbered consecutively as issued and bear date at the time of their issue. Coupons for the interest shall be attached to each bond signed by the secretary. Said bonds shall express on their face that they were issued by authority of this act, stating its title and date of approval. The secretary shall keep a record of the bonds sold, their number, the date of sale, the price received, and the name of the purchaser.

Sec. 16. The board may sell said bonds from time to time, in such quantities as may be necessary and most advantageous to raise money for the construction of said canals and works, the acquisition of said property and rights, and otherwise to fully carry out the objects and purposes of this act. Before making any sale the board shall, at a meeting, by resolution, declare its intention to sell a specified amount of the bonds, and the day and hour and place of such sale, and shall cause such resolution to be entered in the minutes, and notice of the sale to be given, by publication thereof at least twenty days in a daily newspaper published in each of the cities of San Francisco, Sacramento and Los Angeles, and in any other newspaper, at their discretion. The notice shall state that sealed proposals will be received by the board at their office, for the purchase of the bonds, till the day and hour named in the resolution. At the time appointed the board shall open the proposals and award the purchase of the bonds to the highest responsible bidder, and may reject all bids; but said board shall in no event sell any of the said bonds for less than 90 per cent of the face value thereof.

Sec. 17. Said bonds and the interest thereon shall be paid by revenue derived from an annual assessment upon the real property of the district, and all the real property in the district shall be and remain liable to be assessed for such payments as hereinafter provided.

Sec. 18. The Assessor must between the first Monday in March and the first Monday in June in each year assess all real property in the district to the persons who own, claim, have possession or control thereof at its full cash value. He must prepare an assessment book with appropriate headings in which must be listed all such property within the district, in which must be specified in separate columns under the appropriate head:

First—The name of the person to whom the property is assessed. If the name is not known to the Assessor the property shall be assessed to "unknown owners."

Second—Land by township, range, section or fractional section, and when such land is not a Congressional division or subdivision, by metes and bounds, or other description sufficient to identify it, giving an estimate of the number of acres, locality and the improvements thereon.

Third—City and town lots, naming the city or town and the number and block according to the system of numbering in such city or town, and the improvements thereon.

Fourth—The cash value of real estate, other than city or town lots.

Fifth—The cash value of improvements on such real estate.

Sixth—The cash value of city and town lots.

Seventh—The cash value of improvements on city and town lots.

Eighth—The cash value of improvements on real estate assessed to persons other than the owners of the real estate.

Ninth—The total value of all property assessed.

Tenth—The total value of all property after equalization by the board of directors.

Eleventh—Such other things as the board of directors may require.

[Any property which may have escaped the payment of any assessment for any year, shall, in addition to the assessment for the then current year, be assessed for such year with the same effect and with the same penalties as are provided for such current year.] (Amendment approved March 31, 1891.)

The words in brackets are new matter.

Sec. 19. The board of directors must allow

the Assessor as many deputies, to be appointed by him, as will, in the judgment of the board, enable him to complete the assessment within the time herein prescribed. The board must fix the compensation of such deputies, which shall be paid out of the treasury of the district. The compensation must not exceed \$5 per day for each deputy for the time actually engaged, nor must any allowance be made but for work done between the first Monday in March and the first Monday in August in each year.

Sec. 20. On or before the first Monday in August in each year the Assessor must complete his assessment book and deliver it to the secretary of the board, who must immediately give notice thereof, and of the time the board of directors, acting as a board of equalization, will meet to equalize assessments, by publication in a newspaper published in each of the counties comprising the district. The time fixed for the meeting shall not be less than twenty nor more than thirty days from the first publication of the notice; and in the meantime the assessment book must remain in the office of the secretary for the inspection of all persons interested.

Sec. 21. Upon the day specified in the notice required by the preceding section for the meeting, the board of directors, which is hereby constituted a board of equalization for that purpose, shall meet and continue in session from day to day as long as may be necessary, not to exceed ten days, exclusive of Sundays, to hear and determine such objections to the valuation and assessment as may come before them, and the board may change the valuation as may be just. The secretary of the board shall be present during its sessions, and note all changes made in the valuation of property and in the names of the persons whose property is assessed; and within ten days after the close of the session he shall have the total values, as finally equalized by the board, extended into columns and added.

Sec. 22. The board of directors shall then levy an assessment sufficient to raise the annual interest on the outstanding bonds, and at the expiration of ten years after the issuing of bonds of any issue must increase said assessment to an amount sufficient to raise a sum sufficient to pay the principal of the outstanding bonds as they mature. The secretary of the board must compute and enter in a separate column of the assessment book the respective sums, in dollars and cents, to be paid as an assessment on the property therein enumerated. When collected the assessment shall be paid into the district treasury, and shall constitute a special fund, to be called the "bond fund of — irrigation district." In case of the neglect or refusal of the board of directors to cause such assessment and levy to be made as in this act provided, then the assessment of property made by the county Assessor and the State Board of Equalization shall be adopted, and shall be the basis of assessments for the district, and the Board of Supervisors of the county in which the office of the board of directors is situated shall cause an assessment roll for said district to be prepared, and shall make the levy required by this act in the same manner and with like effect as if the same had been made by said board of directors, and all expenses incident thereto shall be borne by such district. In case of the neglect or refusal of the collector or treasurer of the district to perform the duties imposed by law, then the Tax Collector and Treasurer of the county in which the office of the board of directors is situated must respectively perform such duties, and shall be accountable therefor upon their official bonds, as in other cases. (Amendment approved March 20, 1891.)

This section was amended so as to correspond with the amendment to section 15, and before this amendment read as follows:

Sec. 22. The board of directors shall then levy an assessment sufficient to raise the annual interest on the outstanding bonds; and at the expiration of ten years after the issuing of bonds by the board must increase said assessment for the ensuing ten years in the following percentage of the principal of the whole amount of bonds then outstanding, to wit: For the eleventh year, 5 per cent; for the twelfth year, 6 per cent; for the thirteenth year, 7 per cent; for the fourteenth

year, 8 per cent; for the fifteenth year, 9 per cent; for the sixteenth year, 10 per cent; for the seventeenth year, 11 per cent; for the eighteenth year, 13 per cent; for the nineteenth year, 15 per cent; for the twentieth year, a percentage sufficient to pay off said bonds. The secretary of the board must compute and enter into a separate column of the assessment book the respective sums, in dollars and cents, to be paid as an assessment on the property therein enumerated. When collected, the assessment shall be paid into the district treasury, and shall constitute a special fund, to be called the "Bond fund of — irrigation district." In case of the neglect or refusal of the board of directors to cause such assessment and levy to be made, as in this act provided, then the assessment of property made by the County Assessor and the State Board of Equalization shall be adopted, and shall be the basis of assessments for the district, and the Board of Supervisors of the county in which the office of the board of directors is situated shall cause an assessment roll for said district to be prepared, and shall make the levy required by this act in the same manner and with like effect as if the same had been made by said board of directors, and all expenses incident thereto shall be borne by such district. In case of the neglect or refusal of the collector or treasurer of the district to perform the duties imposed by law, then the Tax Collector or Treasurer of the county in which the office of the board of directors is situated must, respectively, perform such duties, and shall be accountable therefor upon their official bonds as in other cases.

Sec. 23. The assessment upon real property is a lien against the property assessed from and after the first Monday in March in any year [and the lien for the bonds of any issue shall be a preferred lien to that for any subsequent issue], and such lien is not removed until the assessments are paid or the property sold for the payment thereof. (Amendment approved March 20, 1891.)

The words in brackets are new matter.

Sec. 24. On or before the last day of November the secretary must deliver the assessment book to the collector of the district, who shall within twenty days publish a notice in a newspaper published in each county in which any portion of the district may lie that said assessments are due and payable, and will become delinquent at 6 P. M. on the last Monday of December next thereafter, and that unless paid prior thereto 5 per cent will be added to the amount thereof, and also the time and place at which payment of assessments may be made, which notice shall be published for the period of two weeks. The collector must attend at the time and place specified in the notice to receive assessments, which must be paid in gold and silver coin; he must mark the date of payment of any assessment in the assessment book opposite the name of the person paying, and give a receipt to such person specifying the amount of the assessment and the amount paid, with a description of the property assessed. On the [last Monday in December, at 6 P. M.] of each year all unpaid assessments are delinquent, and thereafter the collector must collect thereon for the use of the district an addition of 5 per cent. (Amendment approved March 31, 1891.)

The words in brackets were substituted for the words, "31st day of December."

Sec. 25. On or before the last day of February the collector must publish the delinquent list, which must contain the names of the persons and a description of the property delinquent, and the amount of the assessments and costs due opposite each name and description. He must append to and publish with the delinquent list a notice that unless the assessments delinquent, together with costs and percentage, are paid, the real property upon which such assessments are a lien will be sold at public auction. The publication must be made once a week for three successive weeks in a newspaper published in the county in which the property delinquent is situated; provided, that if any property assessed to the same person or corporation shall lie in more than one county, then such publication may be made in any county in which any portion of such property may lie. The publication must designate the time and place of sale. The time of sale must not be less than twenty-one nor more than twenty-eight days from the first publication, and the place must be at some point designated by the collector within the district.

(Amendment approved March 31, 1891.)

Before the above amendment, where any district lay in more than one county, it was necessary to publish the entire delinquent list in each county in which any portion of the district lay.

Sec. 26. The collector must collect, in addition to the assessments due on the delinquent list and 5 per cent added, 50 cents on each lot, piece or tract of land separately assessed, one-half of which must go to the district and the other to the collector for preparing the list. On the day fixed for the sale, or some subsequent day to which he may have postponed it, of which he must give notice, the collector, between the hours of 10 A. M. and 3 P. M., must commence the sale of the property advertised, commencing at the head of the list and continue alphabetically, or in the numerical order of the lots or blocks, until completed. He may postpone the day of commencing the sales, or the sale, from day to day, but the sale must be completed within three weeks from the day first fixed; [provided, that if any sale or sales shall be stayed by injunction the time of the continuance of the injunction is not part of the time limited for making such sale or sales.] (Amendment approved March 31, 1891.)

The words in brackets are new matter.

Sec. 27. The owner or person in possession of any real estate offered for sale for assessments due thereon may designate, in writing, to the collector, prior to the sale, what portion of the property he wishes sold, if less than the whole; but if the owner or possessor does not, then the collector may designate it, and the person who will take the least quantity of the land, or in case an undivided interest is assessed, then the smallest portion of the interest, and pay the assessments and costs due, including \$2 to the collector for the duplicate certificate of sale, is the purchaser. If the purchaser does not pay the assessments and costs before 10 A. M. the following day, the property on the next sale day must be resold for the assessments and costs. [But in case there is no purchaser in good faith for the same on the first day that the property is offered for sale, then, when the property is offered thereafter for sale, and there is no purchaser in good faith for the same, the whole amount of the property assessed shall be struck off to the irrigation district within which such lands are situated as the purchaser, and the duplicate certificate delivered to the treasurer of the district, and filed by him in his office. No charge shall be made for the duplicate certificate where the district is the purchaser, and in such case the collector shall make an entry, "Sold to the district," and he shall be credited with the amount thereof in his settlement. An irrigation district, as a purchaser at such sale, shall be entitled to the same rights as a private purchaser, and the title so acquired by the district, subject to the right of redemption herein provided, may be conveyed by deed, executed and acknowledged by the president and secretary of said board; provided, that authority to so convey must be conferred by resolution of the board, entered on its minutes, fixing the price at which such sale may be made, and such conveyance shall not be made for a less sum than the reasonable market value of such property.] After receiving the amount of assessments and costs the collector must make out in duplicate a certificate, dated on the day of sale, stating (when known) the name of the person assessed, a description of the land sold, the amount paid therefor, that it was sold for assessments, giving the amount and year of the assessment, and specifying the time when the purchaser will be entitled to a deed. The certificate must be signed by the collector and one copy delivered to the purchaser and the other filed in the office of the County Recorder of the county in which the land is situated. (Amendment approved February 16, 1889.)

The matter in brackets was added by the amendment.

Sec. 28. The collector, before delivering any certificate, must in a book enter a description of the land sold, corresponding with the description in the certificate, the date of the sale, purchasers' names and amount paid, regularly number the description on the margin of the book, and put a corresponding number

on each certificate. Such book must be open to public inspection, without fee, during office hours, when not in actual use. On filing the certificate with such County Recorder the lien of the assessment vests with the purchaser, and is only divested by the payment to him, or to the collector for his use, of the purchase money and 2 per cent per month from the day of sale until redemption.

Sec. 29. A redemption of the property sold may be made by the owner, or any party in interest, within twelve months from the date of purchase. Redemption must be made in gold or silver coin, as provided for the collection of State and county taxes, and when made to the collector he must credit the amount paid to the person named in the certificate, and pay it, on demand, to the person or his assignees. In each report the collector makes to the board of directors he must name the person entitled to redemption money, and the amount due to each. On receiving the certificate of sale the County Recorder must file it and make an entry in a book similar to that required of the collector. On the presentation of the receipt of the person named in the certificate, or of the collector, for his use, of the total amount of redemption money, the Recorder must mark the word "Redeemed," the date, and by whom redeemed, on the certificate and on the margin of the book where the entry of the certificate is made. If the property is not redeemed within twelve months from the sale, the collector, or his successor in office, must make to the purchaser, or his assignee, a deed of the property, reciting in the deed substantially the matters contained in the certificate, and that no person redeemed the property during the time allowed by law for its redemption. The collector shall receive from the purchaser, for the use of the district, \$2 for making such deed.

Sec. 30. The matter recited in the certificate of sale must be recited in the deed, and such deed, duly acknowledged or proved, is prima facie evidence that:

First—The property was assessed as required by law.

Second—The property was equalized as required by law.

Third—That the assessments were levied in accordance with law.

Fourth—The assessments were not paid.

Fifth—At a proper time and place the property was sold as prescribed by law, and by the proper officer.

Sixth—The property was not redeemed.

Seventh—The person who executed the deed was the proper officer.

Such deed duly acknowledged or proved is (except as against actual fraud) conclusive evidence of the regularity of all the proceedings from the assessment by the Assessor, inclusive, up to the execution of the deed. The deed conveys to the grantee the absolute title to the lands described therein free of all incumbrances, except when the land is owned by the United States or this State, in which case it is prima facie evidence of the right of possession.

Sec. 31. The assessment book or delinquent list, or a copy thereof, certified by the collector, showing: unpaid assessments against any person or property, is prima facie evidence of the assessment, the property assessed, the delinquency, the amount of assessments due and unpaid, and that all the forms of the law in relation to the assessment and levy of such assessments have been complied with.

Sec. 32. When land is sold for assessments correctly imposed, as the property of a particular person, no misnomer of the owner or supposed owner, or other mistake relating to the ownership thereof, affects the sale or renders it void or voidable.

Sec. 33. On the first Monday in each month the collector must settle with the secretary of the board for all moneys collected for assessments, and pay the same over to the treasurer; and within six days thereafter he must deliver to and file in the office of the secretary a statement under oath, showing:

First—An account of all his transactions and receipts since his last settlement.

Second—That all money collected by him as collector has been paid.

The collector shall also file in the office of

the secretary on said first Monday in each month the receipt of the treasurer for the money so paid.

Sec. 34. Upon the presentations of the coupons due to the treasurer, he shall pay the same from said bond fund. Whenever, after ten years from the issuance of said bonds, said fund shall amount to the sum of \$10,000, the board of directors may direct the treasurer to pay such an amount of said bonds not due as the money in said fund will redeem, at the lowest value at which they may be offered for liquidation, after advertising for at least four weeks in some daily newspaper in each of the cities hereinbefore named, and in any other newspaper which said board may deem advisable, for sealed proposals for the redemption of said bonds. Said proposals shall be opened by the board in open meeting, at a time to be named in the notice, and the lowest bid for said bonds must be accepted; provided, that no bond shall be redeemed at a rate above par. In case the bids are equal, the lowest numbered bond shall have the preference. In case none of the holders of said bonds shall desire to have the same redeemed, as herein provided for, said money shall be invested by the treasurer, under the direction of the board, in United States gold-bearing bonds, or the bonds of the State, which shall be kept in said "Bond fund," and may be used to redeem said district bonds whenever the holders thereof may desire.

Sec. 35. After adopting a plan for said canal or canals, storage reservoirs and works, the board of directors shall give notice, by publication thereof not less than twenty days in one newspaper published in each of the counties composing the district (provided a newspaper is published therein), and in such other newspapers as they may deem advisable, calling for bids for the construction of such work, or of any portion thereof; if less than the whole work is advertised, then the portion so advertised must be particularly described in such notice. Said notice shall set forth that plans and specifications can be seen at the office of the board, and that the board will receive sealed proposals therefor, and that the contract will be let to the lowest responsible bidder, stating the time and place for opening said proposals, which, at the time and place appointed, shall be opened in public; and as soon as convenient thereafter the board shall let said work, either in portions or as a whole, to the lowest responsible bidder; or they may reject any or all bids and readvertise for proposals, or may proceed to construct the work under their own superintendence. Contracts for the purchase of material shall be awarded to the lowest responsible bidder. Any person or persons to whom a contract may be awarded shall enter into a bond, with good and sufficient sureties, to be approved by the board, payable to said district for its use, for 25 per cent of the amount of the contract price, conditioned for the faithful performance of said contract. The work shall be done under the direction and to the satisfaction of the engineer and be approved by the board. (Amendment approved March 20, 1891.)

Before the above amendment, any work done under the superintendence of the board of directors, and not by contract awarded under competitive bids, was required to be done wholly by the residents of the district; and contractors were required to give bond in double the amount of the contract price.

Sec. 36. No claim shall be paid by the treasurer until allowed by the board, and only upon a warrant signed by the president and countersigned by the secretary; provided, that the board may draw from time to time from the construction fund and deposit in the County Treasury of the county where the office of the board is situated any sum in excess of \$25,000. The County Treasurer of said county is hereby authorized and required to receive and receipt for the same and place the same to the credit of said district, and he shall be responsible upon his official bond for the safe keeping and disbursement of the same as in this act provided. He shall pay out the same or any portion thereof to the treasurer of the district only, and only upon the order of the board signed by the president and attested by

the secretary. The said County Treasurer shall report in writing on the second Monday in each month the amount of money in the County Treasury, the amount of receipts for the month preceding and the amount or amounts paid out; said report shall be verified and filed with the secretary of the board. The district treasurer shall also report to the board in writing on the first Monday in each month the amount of money in the district treasury, the amount of receipts for the month preceding and the amount and items of expenditures, and said report shall be verified and filed with the secretary of the board.

Sec. 37. The cost and expense of purchasing and acquiring property and constructing the works and improvements herein provided for shall be wholly paid out of the construction fund. For the purpose of defraying the expenses of the organization of the district and of the care, operation, management, repair and improvement of such portions of said canal and works as are completed and in use, including salaries of officers and employees, the board may either fix rates of tolls and charges and collect the same from all persons using said canal for irrigation and other purposes, or they may provide for the payment of said expenditures by a levy of assessments therefor, or by both said tolls and assessments; if by the latter method, such levy shall be made on the completion and equalization of the assessment roll, and the board shall have the same powers and functions for the purposes of said levy as are now possessed by Boards of Supervisors in this State. The procedure for the collection of assessments by such levy shall in all respects conform to the provisions of this act relating to the payment of principal and interest of bonds herein provided for.

Sec. 38. The board of directors shall have power to construct the said works across any stream of water, watercourse, street, avenue, highway, railway, canal, ditch or flume which the route of said canal or canals may intersect or cross, in such manner as to afford security for life and property; but said board shall restore the same, when so crossed or intersected, to its former state as near as may be, or in a sufficient manner not to have impaired unnecessarily its usefulness; and every company whose railroad shall be intersected or crossed by said works shall unite with said board in forming said intersections and crossings, and grant the privileges aforesaid; and if such railroad company and said board, or the owners and controllers of the said property, thing or franchise so to be crossed, cannot agree upon the amount to be paid therefor, or the points or the manner of said crossings or intersections, the same shall be ascertained and determined in all respects as herein provided in respect to the taking of land. The right of way is hereby given, dedicated and set apart to locate, construct and maintain said works over and through any of the lands which are now or may be the property of this State; and also there is given, dedicated and set apart for the uses and purposes aforesaid all waters and water rights belonging to this State within the district.

Sec. 39. The board of directors shall receive four dollars per day and mileage at the rate of twenty cents per mile in attending meetings and actual and necessary expenses paid while engaged in official business under the order of the board. The board shall fix the compensation to be paid to the other officers named in the act, to be paid out of the treasury of the district; provided, that said board shall, upon the petition of at least fifty or a majority of the freeholders within such district therefor, submit to the electors at any general election a schedule of salaries and fees to be paid hereunder. Such petition must be presented to the board twenty days prior to a general election, and the result of such election shall be determined and declared in all respects as other elections are determined and declared under this act.

Sec. 40. No director or any other officer named in this act shall in any manner be interested directly or indirectly in any contract awarded or to be awarded by the board, or in

the profits to be derived therefrom; and for any violation of this provision such officer shall be deemed guilty of a misdemeanor and such conviction shall work a forfeiture of his office and he shall be punished by a fine not exceeding five hundred dollars or by imprisonment in the county jail not exceeding six months or by both such fine and imprisonment.

Sec. 41. The Board of Directors may, at any time, when in their judgment it may be advisable, call a special election and submit to the qualified electors of the district the question whether or not a special assessment shall be levied for the purpose of raising money to be applied to any of the purposes provided in this act. Such election must be called upon the notice prescribed, and the same shall be held and the result thereof determined and declared in all respects in conformity with the provisions of section 15 of this act. The notice must specify the amount of money proposed to be raised and the purpose for which it is intended to be used. At such elections the ballots shall contain the words "Assessment—Yes," or "Assessment—No." If two-thirds or more of the votes cast are "Assessment—Yes," the board shall, at the time of the annual levy hereunder, levy an assessment sufficient to raise the amount voted. The rate of assessment shall be ascertained by deducting 15 per cent for anticipated delinquencies from the aggregate assessed value of the property in the district as it appears on the assessment roll for the current year, and then dividing the sum voted by the remainder of such aggregate assessed value. The assessment so levied shall be computed and entered on the assessment roll by the secretary of the board and collected at the same time and in the same manner as other assessments provided for herein; and when collected shall be paid into the district treasury for the purposes specified in the notice of such special election.

Sec. 42. The board of directors, or other officers of the district, shall have no power to incur any debt or liability whatever, either by leasing bonds or otherwise, in excess of the express provisions of this act; and any debt or liability incurred in excess of such express provisions shall be and remain absolutely void, [except that for the purpose of organization, or for any of the purposes of this Act, the board of directors may, before the collection of the first assessment, incur an indebtedness not exceeding in the aggregate the sum of \$2000, and may cause warrants of the district to issue therefor, bearing interest at 7 per cent per annum.] (Amendment approved March 20, 1891.)

The words in brackets are new matter.

Sec. 43. In case the volume of water in any stream or river shall not be sufficient to supply the continual wants of the entire country through which it passes, and susceptible of irrigation therefrom, then it shall be the duty of the water commissioners, constituted as hereinafter provided, to apportion, in a just and equitable proportion, a certain amount of said water upon certain or alternate weekly days to different localities, as they may, in their judgment, think best for the interest of all parties concerned, and with due regard to the legal and equitable rights of all. Said water commissioners shall consist of the chairman of the board of directors of each of the districts affected.

Sec. 44. It shall be the duty of the board of directors to keep the water flowing through the ditches under their control to the full capacity of such ditches in times of high water.

Sec. 45. Navigation shall never in anywise be impaired by the operation of this act, nor shall any vested interest in or to any mining water rights or ditches, or in or to any water or water rights or reservoirs or dams now used by the owners or possessors thereof in connection with any mining industry, or by persons purchasing or renting the use thereof, or in or to any other property now used, directly or indirectly, in carrying on or promoting the mining industry, ever be affected by or taken under its provisions, save and except that rights of way may be acquired over the same.

Sec. 46. None of the provisions of this act shall be construed as repealing or in anywise modifying the provisions of any other act relating to the subject of irrigation or water commissioners. Nothing herein contained shall be deemed to authorize any person or persons to divert the waters of any river, creek, stream, canal or ditch from its channel, to the detriment of any person or persons having any interest in such river, creek, stream, canal or ditch, or the waters therein, unless previous compensation be ascertained and paid therefor, under the laws of this State authorizing the taking of private property for public uses.

Supplemental Acts.

INCLUSION ACT.

[Approved February 16, 1889.]

SECTION 1. The boundaries of any irrigation district now or hereafter organized under the provisions of an act entitled "An act to provide for the organization and government of irrigation districts, and to provide for the acquisition of water and other property, and for the distribution of water thereby for irrigation purposes," approved March 7, 1887, may be changed in the manner herein prescribed; but such change of the boundaries of the district shall not impair or affect its organization, or its rights in or to property, or any of its rights or privileges of whatsoever kind or nature; nor shall it affect, impair or discharge any contract, obligation, lien or charge for or upon which it was or might become liable or chargeable, had such change of its boundaries not been made.

Sec. 2. The holder or holders of title, or evidence of title, representing one-half or more of any body of lands adjacent to the boundary of an irrigation district, which are contiguous, and which, taken together, constitute one tract of land, may file with the board of directors of said district a petition in writing praying that the boundaries of said district may be so changed as to include therein said lands. The petition shall describe the boundaries of said parcel or tract of land, and shall also describe the boundaries of the several parcels owned by the petitioners, if the petitioners be the owners respectively of distinct parcels, but such descriptions need not be more particular than they are required to be when such lands are entered by the County Assessor in the assessment book. Such petition must contain the assent of the petitioners to the inclusion within said district of the parcels or tracts of land described in the petition, and of which said petition alleges they are respectively the owners; and it must be acknowledged in the same manner that conveniences of land are required to be acknowledged.

Sec. 3. The secretary of the board of directors shall cause a notice of the filing of such petition to be given and published in the same manner and for the same time that notices of special elections for the issue of bonds are required by said act to be published. The notice shall state the filing of such petition and the names of the petitioners, a description of the lands mentioned in said petition, and the prayer of said petition; and it shall notify all persons interested in or that may be affected by such change of the boundaries of the district to appear at the office of said board at a time named in said notice and show cause in writing, if any they have, why the change in the boundaries of said district, as proposed in said petition, should not be made. The time to be specified in the notice at which they shall be required to show cause shall be the regular meeting of the board next after the expiration of the time for the publication of the notice. The petitioners shall advance to the secretary sufficient money to pay the estimated costs of all proceeding under this act.

Sec. 4. The board of directors, at the time and place mentioned in the said notice, or at such other time or times to which the hearing of said petition may be adjourned, shall proceed to hear the petition, and all the objections thereto, presented in writing by any person showing cause as aforesaid why said proposed

change of the boundaries of the district should not be made. The failure by any person interested in said district, or in the matter of the proposed change of its boundaries, to show cause, in writing, as aforesaid, shall be deemed and taken as an assent on his part to a change of the boundaries of the district as prayed for in said petition, or to such change thereof as will include a part of said lands. And the filing of such petition with said board, as aforesaid, shall be deemed and taken as an assent on the part of each and all of such petitioners to such a change of said boundaries that they may include the whole or any portion of the lands described in said petition.

Sec. 5. The board of directors to whom such petition is presented may require, as a condition precedent to the granting of the same, that the petitioners shall severally pay to such district such respective sums, as nearly as the same can be estimated (the several amounts to be determined by the board), as said petitioners or their grantors would have been required to pay to such district as assessments had such lands been included in such district at the time the same was originally formed.

Sec. 6. The board of directors, if they deem it not for the best interests of the district that a change of its boundaries be so made as to include therein the lands mentioned in the petition shall order that the petition, be rejected. But if they deem it for the best interests of the district that the boundaries of said district be changed, and if no person interested in said district or the proposed change of its boundaries shows cause in writing why the proposed change should not be made, or if, having shown cause, withdraws the same, the board may order that the boundaries of the district be so changed as to include therein the lands mentioned in said petition or some part thereof. The order shall describe the boundaries as changed and shall also describe the entire boundaries of the district as they will be after the change thereof as aforesaid is made, and for that purpose the board may cause a survey to be made of such portions of said boundary as is deemed necessary.

Sec. 7. If any person interested in said district, or the proposed change of its boundaries, shall show cause as aforesaid why such boundaries should not be changed, and shall not withdraw the same, and if the board of directors deem it for the best interests of the district that the boundaries thereof be so changed as to include therein the lands mentioned in the petition, or some part thereof, the board shall adopt a resolution to that effect. The resolution shall describe the exterior boundaries of the lands which the board are of the opinion should be included within the boundaries of the district when changed.

Sec. 8. Upon the adoption of the resolution mentioned in the last preceding section the board shall order that an election be held within said district to determine whether the boundaries of the district shall be changed as mentioned in said resolution, and shall fix the time at which such election shall be held, and cause notice thereof to be given and published. Such notice shall be given and published, and such election shall be held and conducted, the returns thereof shall be made and canvassed, and the result of the election ascertained and declared, and all things pertaining thereto conducted in the manner prescribed by said act in case of a special election to determine whether bonds of an irrigation district shall be issued. The ballots cast at said election shall contain the words "For change of boundary," or "Against change of boundary," or words equivalent thereto. The notice of election shall describe the proposed change of the boundaries in such manner and terms that it can readily be traced.

Sec. 9. If at such election a majority of all the votes cast at said election shall be against such change of the boundaries of the district the board shall order that said petition be denied, and shall proceed no further in that matter. But if a majority of such votes be in favor of such change of the boundaries of the district the board shall thereupon order that the boundaries be changed in accordance with said res-

olution adopted by the Board. The said order shall describe the entire boundaries of said district, and for that purpose the board may cause a survey of such portions thereof to be made as the board may deem necessary.

Sec. 10. Upon a change of the boundaries of a district being made a copy of the order of the board of directors ordering such change, certified by the president and secretary of the board, shall be filed for record in the Recorder's office of each county within which are situated any of the lands of the district, and thereupon the district shall be and remain an irrigation district, as fully and to every intent and purpose as if the lands which are included in the district by the change of the boundaries, as aforesaid, had been included therein at the original organization of the district.

Sec. 11. Upon the filing of the copies of the order, as in the last preceding section mentioned, the secretary shall record in the minutes of the board the petition aforesaid; and the said minutes, or a certified copy thereof, shall be admissible in evidence, with the same effect as the petition.

Sec. 12. A guardian, an executor or an administrator of an estate, who is appointed as such under the laws of this State, and who, as such guardian, executor or administrator, is entitled to the possession of the lands belonging to the estate which he represents, may, on behalf of his ward or the estate which he represents, upon being thereunto authorized by the proper court, sign and acknowledge the petition in this act mentioned, and may show cause, as in this act mentioned, why the boundaries of the district should not be changed.

Sec. 13. In case of the inclusion of any land within any district by proceedings under this act the board of directors must, at least thirty days prior to the next succeeding general election, make an order redividing such district into five divisions as nearly equal in size as may be practicable, which shall be numbered first, second, third, fourth and fifth, and one director shall thereafter be elected by each division. For the purposes of elections the board of directors must establish a convenient number of election precincts in said districts and define the boundaries thereof, which said precincts may be changed from time to time, as the board may deem necessary.

EXCLUSION ACT.

[Approved February 16, 1889.]

SECTION 1. The boundaries of any irrigation district now or hereafter organized under the provisions of an act entitled "An act to provide for the organization and government of irrigation districts, and to provide for the acquisition of water and other property, and for the distribution of water thereby for irrigation purposes," approved March 7, 1887, may be changed, and tracts of land which were included within the boundaries of such district at or after its organization under the provisions of said act may be excluded therefrom, in the manner herein prescribed; but neither such change of the boundaries of the district, nor such exclusion of lands from the district, shall impair or affect its organization, or its right in or to property, or any of its rights or privileges, of whatever kind or nature; nor shall it affect, impair or discharge any contract, obligation, lien or charge for or upon which it was or might become liable or chargeable had such change of its boundaries not been made or had not any land been excluded from the district.

Sec. 2. The owner or owners in fee of one or more tracts of land which constitute a portion of an irrigation district may file with the board of directors of the district a petition praying that such tracts, and any other tracts contiguous thereto, may be excluded and taken from said district. The petition shall describe the boundaries of the land which the petitioners desire to have excluded from the district, and also the lands of each of such petitioners which are included within such boundaries; but the description of such lands need not be more particular or certain than is required when the lands are entered in the assessment book by the County Assessor. Such petition must be acknowledged in the same manner and form as is required in case of a

conveyance of land, and the acknowledgment shall have the same force and effect as evidence as the acknowledgment of such conveyance.

Sec. 3. The secretary of the board of directors shall cause a notice of the filing of such petition to be published for at least two weeks in some newspaper published in the county where the office of the board of directors is situated, and if any portion of such territory to be excluded lie within another county or counties, then said notice shall be so published in a newspaper published within each of said counties; or if no newspaper be published therein, then by posting such notice for the same time in at least three public places in said district, and, in case of the posting of said notices, one of said notices must be so posted on the lands proposed to be excluded. The notice shall state the filing of such petition; the names of the petitioners; a description of the lands mentioned in said petition and the prayer of said petition; and it shall notify all persons interested in, or that may be affected by such change of the boundaries of the district, to appear at the office of said board at a time named in said notice, and show cause, in writing, if any they have, why the change of the boundaries of said district, as proposed in said petition, should not be made. The time to be specified in the notice at which they shall be required to show cause shall be the regular meeting of the board next after the expiration of the time for the publication of the notice.

Sec. 4. The board of directors, at the time and place mentioned in the notice, or at the time or times to which the hearing of said petition may be adjourned, shall proceed to hear the petition and all objections thereto presented in writing by any person showing cause as aforesaid why the prayer of said petition should not be granted. The failure of any person interested in said district to show cause, in writing, why the tract or tracts of land mentioned in said petition should not be excluded from said district shall be deemed and taken as an assent by him to the exclusion of such tract or tracts of land, or any part thereof, from said district; and the filing of such petition with such board, as aforesaid, shall be deemed and taken as an assent by each and all of such petitioners to the exclusion from such district of the lands mentioned in the petition, or any part thereof.

Sec. 5. The board of directors, if they deem it not for the best interests of the district that the lands mentioned in the petition, or some portion thereof, should be excluded from said district, shall order that said petition be denied: but if they deem it for the best interests of the district that lands mentioned in the petition, or some portion thereof, be excluded from the district, and if no person interested in the district show cause in writing why the said lands, or some portion thereof, should not be excluded from the district, or if, having shown cause, withdraws the same, and also, if there be no outstanding bonds of the district, then the board may order that the lands mentioned in the petition, or some defined portion thereof, be excluded from the district.

Sec. 6. If there be outstanding bonds of the district, then the board may adopt a resolution to the effect that the board deems it to be the best interest of the district that the lands mentioned in the petition, or some portion thereof, should be excluded from the district. The resolution shall describe such lands so that the boundaries thereof can readily be traced. The holders of such outstanding bonds may give their assent in writing to the effect that they severally consent that the board may make an order by which the lands mentioned in the resolution may be excluded from the district. The assent must be acknowledged by the several holders of such bonds in the same manner and form as is required in case of a conveyance of land, and the acknowledgment shall have the same force and effect as evidence as the acknowledgment of such conveyance. The assent shall be filed with the board, and must be recorded in the minutes of the board; and said minutes, or a certified copy thereof, shall be admissible in evidence with the same effect as said assent; but if such assent be not filed, the board shall deny and dismiss said petition.

Sec. 7. If the assent aforesaid of the holders of said bonds be filed and entered of record as aforesaid, and if there be objections presented by any person showing cause as aforesaid, which have not been withdrawn, then the board may order an election to be held in said district to determine whether an order shall be made excluding said land from the district as mentioned in said resolution. The notice of such election shall describe the boundary of all lands which it is proposed to exclude, and such notice shall be published for at least two weeks prior to such election in a newspaper published within the county where the office of the board of directors is situated; and if any portion of such territory to be excluded lie within another county or counties, then said notice shall be so published in a newspaper published within each of such counties. Such notice shall require the electors to cast ballots which shall contain the words "For Exclusion," or "Against Exclusion," or words equivalent thereto. Such election shall be conducted in accordance with the general election laws of the State; provided, that no particular form of ballot shall be required.

Sec. 8. If at such election a majority of all the votes cast shall be against the exclusion of said lands from the district, the board shall deny and dismiss said petition and proceed no further in said matter; but if a majority of such votes be in favor of the exclusion of said lands from the district, the board shall thereupon order that the said lands mentioned in said resolution be excluded from the district. The said order shall describe the boundaries of the district should the exclusion of the said lands from said district change the boundaries of the district; and for that purpose the board may cause a survey to be made of such portions of the boundaries as the board may deem necessary.

Sec. 9. Upon the entry in the minutes of the board of any of the orders hereinbefore mentioned, a copy thereof, certified by the president and the secretary of the board, shall be filed for record in the Recorder's office of each county within which are situated any of the lands of the district, and thereupon said district shall be and remain an irrigation district as fully, to every intent and purpose, as it would be had no change been made in the boundaries of the district, or had the lands excluded therefrom never constituted a portion of the district.

Sec. 10. If the lands excluded from any district under this act shall embrace the greater portion of any division or divisions of such district, then the office of director for such division or divisions shall become and be vacant at the expiration of ten days from the final order of the board, under section 8 of this act, excluding said lands, and such vacancy or vacancies shall be filled by appointment by the Board of Supervisors of the county where the office of such board is situated from the district at large. A director, appointed as above provided, shall hold his office until the next regular election for said district and until his successor is elected and qualified.

Sec. 11. At least thirty days before the next general election of such district the board of directors thereof shall make an order dividing said district into five divisions, as nearly equal in size as may be practicable, which shall be numbered first, second, third, fourth and fifth, and one director shall be elected by each division. For the purpose of elections in such district, the said board of directors must establish a convenient number of election precincts and define the boundaries thereof, which said precincts may be changed from time to time, as the board of directors may deem necessary.

Sec. 12. A guardian, an executor, or an administrator of an estate, who is appointed as such under the laws of this State, and who, as such guardian, executor or administrator, is entitled to the possession of the lands belonging to the estate which he represents, may, on behalf of his ward or the estate which he represents, upon being thereto properly authorized by the proper court, sign and acknowledge the petition in this act mentioned, and may show cause, as in this act provided, why the boundaries of the district should not be changed.

Sec. 13. In case of the exclusion of any land

under the provisions of this act there shall be refunded to any and all persons who have paid any assessment or assessments to such district, or any lands so excluded, any sum or sums so paid. Such payments shall be made in the same manner as other claims against such district and from such fund or funds as the board of directors may designate.

CONFIRMATION ACT.

[Approved March 16, 1889.]

SECTION 1. The board of directors of an irrigation district now or hereafter organized under the provisions of an act entitled "An act to provide for the organization and government of irrigation districts, and to provide for the acquisition of water and other property and for the distribution of water thereby for irrigation purposes," approved March 7, 1887, may commence a special proceeding in and by which the proceedings of said board and of said district providing for and authorizing the issue and sale of the bonds of said district, whether said bonds, or any of them, have or have not been sold, may be judicially examined, approved and confirmed.

Sec. 2. The board of directors of the irrigation district shall file in the Superior Court of the county in which the lands of the district, or some portion thereof, are situated, a petition praying, in effect, that the proceedings aforesaid may be examined, approved and confirmed by the court. The petition shall state the facts showing the proceedings had for the issue and sale of said bonds, and shall state generally that the irrigation district was duly organized and that the first board of directors was duly elected; but the petition need not state the facts showing such organization of the district or the election of said first board of directors.

Sec. 3. The court shall fix the time for the hearing of said petition, and shall order the Clerk of the court to give and publish a notice of the filing of said petition. The notice shall be given and published in the same manner and for the same length of time that the notice of a special election provided for by said act, to determine whether the bonds of said district shall be issued, is required to be given and published. The notice shall state the time and place fixed for the hearing of the petition and the prayer of the petition, and that any person interested in the organization of said district, or in the proceedings for the issue or sale of said bonds, may, on or before the day fixed for the hearing of said petition, demur to or answer said petition. The petition may be referred to and described in said notice as the petition of the board of directors of — irrigation district (giving its name), praying that the proceedings for the issue and sale of the

bonds of said district may be examined, approved and confirmed by said court.

Sec. 4. Any person interested in said district, or in the issue or sale of said bonds, may demur to or answer said petition. The provisions of the Code of Civil Procedure respecting the demurrer and the answer to a verified complaint shall be applicable to a demurrer and answer to said petition. The persons so demurring to or answering said petition shall be the defendants to said special proceeding, and the board of directors shall be the plaintiff. Every material statement of the petition not specifically controverted by the answer must, for the purpose of said special proceeding, be taken as true; and each person failing to answer the petition shall be deemed to admit as true all the material statements of the petition. The rules of pleading and practice provided by the Code of Civil Procedure which are not inconsistent with the provisions of this act are applicable to the special proceeding herein provided for. A motion for a new trial must be made upon the minutes of the court. The order granting a new trial must specify the issues to be re-examined on such new trial, and the findings of the court upon the other issues shall not be affected by such order granting a new trial.

Sec. 5. Upon the hearing of such special proceeding the court shall have power and jurisdiction to examine and determine the legality and validity of and approve and confirm each and all of the proceedings for the organization of said district under the provisions of the said act, from and including the petition for the organization of the district, and all other proceedings which may affect the legality or validity of said bonds, and the order for the sale and the sale thereof. The court in inquiring into the regularity, legality or correctness of said proceedings must disregard any error, irregularity or omission which does not affect the substantial rights of the parties to said special proceeding; and it may approve and confirm such proceedings in part and disapprove and declare illegal or invalid other and subsequent parts of the proceedings. The court shall find and determine whether the notice of the filing of said petition has been duly given and published for the time and in the manner in this act prescribed. The costs of the special proceedings may be allowed and apportioned between all the parties in the discretion of the court.

Sec. 6. An appeal from an order granting or refusing new trial, or from the judgment, must be taken by the party aggrieved within ten days after the entry of said order or said judgment.



Homes of irrigationists at Redlands.

IN THE COURTS.

VARIOUS POINTS THAT HAVE BEEN LITIGATED.

The Law Upheld by Repeated Decisions of the Supreme Court—History of the Cases.

It is of course desirable that laws embodying so many novel features as this should be passed upon by the courts and their constitutionality determined. Necessarily there were those who thought themselves aggrieved by the new law, and they were not slow in putting the legal machinery into operation for the purpose of securing the relief to which they believed themselves entitled. Happily, however, the law had been most carefully drawn, no loopholes had been left, and in consequence in every one of the suits brought the upholders of the act proved victorious. In order that it may be known exactly what questions were raised and what decisions were reached in regard to each a full report of the litigation so far concluded is given. It will convince any one of the fact that the law is fully and entirely constitutional, and that it is folly to oppose its beneficial operation.

Supreme Court Decisions Construing Irrigation Law.

(No. 12456, In Bank, May 31, 1888.)

TURLOCK IRRIGATION DISTRICT, PETITIONER, VS. R. W. WILLIAMS, SECRETARY, ETC.,

RESPONDENT.

[78 Cal. 360-372.]

Irrigation Districts—Act of March 7, 1887—Constitutional Law.—The act of March 7, 1887, providing for the organization and government of irrigation districts, and the provisions thereof relative to the condemnation of private property, lands, water, etc., for the uses prescribed therein, are constitutional.

Idem—Irrigation Districts Public Corporations.—The irrigation districts provided for in the act are quasi public corporations, in the sense that the purposes for which they are to organize is for the general public benefit.

Idem—Method of Assessment—General System of Taxation.—It is not necessary to their validity that the methods adopted for the levy of assessments and for their collection should be assimilated to and follow exactly the mode provided in the Constitution for the assessment and collection of taxes for general State purposes.

This is a proceeding to compel the respondent, the secretary of the Turlock Irrigation district, to sign certain bonds ordered to be issued against said district by the board of directors thereof.

The act under which said district was organized, and the authority upon which it is asked that the respondent be compelled to sign said bonds, was approved March 7, 1887.

The first section of said statute provides for the organization of irrigation districts upon petitions filed with the Board of Supervisors by fifty or a majority of freeholders owning land susceptible of one mode of irrigation from a common source. It is also required that after a petition is filed the Board of Supervisors shall make an order fixing the boundaries of the district, and shall thereupon call an election, of

which notice is required to be given, at which the electors residing within the proposed district are permitted to vote for or against its organization.

It is also provided that, if two-thirds of the electors residing within said proposed district vote in favor of its organization into an irrigation district, the Board of Supervisors shall declare the district duly organized.

The act also provides for the election of an assessor, collector and treasurer, and a board of five directors for the district. To the board of directors is given the power to manage and conduct the business and affairs of the district, make and execute all necessary contracts, and employ and appoint such agents, officers and employees as may be required, prescribe their duties, establish equitable by-laws, rules and regulations for the distribution and use of the water among the owners of said land, and generally to perform all such acts as shall be necessary to fully carry out the purposes of the act. General powers are given to the board of directors to enter upon lands in the district and make surveys, to locate the lines of canals, to acquire by purchase or condemnation all lands and waters and other property necessary for the construction, use, supply, maintenance, repair and improvement of said canal or canals and works, to construct dams, reservoirs and works for the collection of water, and to do any and every lawful act necessary to be done in order that sufficient water may be furnished to each land owner in said district for irrigation purposes.

Powers are also conferred upon said board of directors to estimate and determine the amount of money necessary to be raised for the purposes of the act, and for the purpose of raising said money to call an election and submit to the electors residing within said district the question whether or not the bonds of said district shall be issued in the amount so determined to be necessary. Said board also has power under said act to sell said bonds.

It is provided by section 13 of said act that the legal title to all property acquired under the provisions thereof shall immediately and by operation of law rest in the irrigation district, and shall be held by such district in trust for the uses and purposes set forth in the act.

In said section it is provided that the board may hold, use, acquire, manage, occupy and possess said property as provided in said act. It is also provided that the bonds issued by the order of the board of directors and the interest thereon shall be paid by revenue derived from an annual assessment upon the real property of the district, and that all the real property in the district shall be and remain liable to be assessed for such payment, as provided in said act. Provision is also made for the assessment of said property by the assessor of the district, for the publication of the delinquent list, the collection of penalties on delinquent assessment, the sale of property for the purpose of paying said assessment, the redemption of the property, the execution of deeds by the collector of said district, transferring absolutely the property of landowners within the district refusing to submit to the tax and assessment provided for, the vesting of title in the purchaser, etc.

It is also provided by section 23 of said act that the assessment upon real property shall constitute a lien against the property assessed from and after the 1st of March of any year, and that such lien shall not be removed until such assessments are paid or the property sold for the payment thereof. Provision is also made for the apportionment of water among the residents of the district. The further facts are stated in the opinion.

P. J. Hazen, Hatton & Fulkerth and W. H. Beatty for petitioner.

The districts provided for in the act of March 7, 1887, are public or quasi public corporations, and the purposes for which they are intended are public. (Tide Water Co. vs. Coster, 18 N. J. Eq. 521; 90 Am. Dec. 634; Hartwell vs. Armstrong, 19 Barb. 166; Lux vs. Haggins, 69 Cal. 303; Gilmer vs. Lime Point, 18 Cal. 252; Cooley on Taxation, 2d ed., 103; Olmstead vs. Camp, 33 Conn., 532; 89 Am. Dec. 221; Talbot vs. Hudson, 82 Mass., 417; Coomes vs. Burt, 39 Mass., 427; Wurts vs. Hoagland,

114 U. S., 606; *Head vs. Amoskeag Manufacturing Co.*, 113 U. S., 9; *Const.*, art. 14, sec. 1; *Hager vs. Reclamation District*, 111 U. S., 701; *Hager vs. Yolo County*, 47 Cal., 222; *Reclamation District vs. Hager*, 66 Cal., 54; *C. W. & Z. R. R. vs. Com. Clinton Co.*, 1 Ohio St., 94; *Barbier vs. Connelly*, 113 U. S., 27; *S. & V. R. R. Co. vs. Stockton*, 41 Cal., 147.) The charge imposed for the purpose of paying the bonds was strictly an assessment for local improvements and not a general tax; consequently the methods adopted for enforcing the assessment need not conform to the requirements of the Constitution in reference to general taxation. (*Dillon on Municipal Corporation*, 752; *Desty on Taxation*, 151-171; *Cooley on Taxation*, 639; *Goodrich vs. W. & D. T. Co.*, 26 Ind. 119; *Creighton vs. Scott*, 14 Ohio St. 433; *Seattle vs. Yesler*, 1 Wash. 571; *Dailey vs. Swope*, 47 Miss. 367; *Mason vs. Spencer*, 35 Kan. 512; *McGehee vs. Mathis*, 21 Ark. 40; *Emery vs. San Francisco Gas Company*, 28 Cal. 346; *Burnett vs. Sacramento*, 12 Cal. 76; 73 Am. Dec. 513.) The Legislature had constitutional authority to commit the power to levy the assessment to a special board. (*Hager vs. Reclamation District No. 108*, 111 U. S. 701.) It is not necessary that the local improvement for which the assessment is levied should be confined within the district taxed. (*Patison vs. Yolo county*, 13 Cal. 189.) The Legislature has power to determine all questions of policy involved in the formation of an irrigation district and might delegate such power to Boards of Supervisors or other subordinate bodies. (*Pearson vs. Zable*, 78 Ky. 170; *Cooley on Taxation*, 150; *Kelsey vs. Trustees of Nevada*, 18 Cal. 630; *Desty on Taxation*, 1247; *Hager vs. Reclamation Dist. No. 108*, 111 U. S. 701; *Abbott vs. Dodge*, 18 Neb. 1240.) The mode provided by the act for the levy and collection of the assessment is not a denial of the due process of law. (*Davidson vs. New Orleans*, 96 U. S. 97; *Hager vs. Yolo county*, 47 Cal. 222; *Burroughs on Taxation*, sec. 145; *Hager vs. Reclamation District No. 108*, 111 U. S. 708.) The assessment need not be strictly according to benefit. Approximation is that that can be attained and all that is required. (*Cooley on Taxation*, 2d ed., 167; *Egyptian L. Co. vs. Hardin*, 27 M. 495; 72 Am. Dec. 279; *Emery vs. S. F. Gas Co.*, 28 Cal. 346.) The assessment in question is as strictly according to benefits as could be attained in any case, and far more so than in most cases of local assessments, and the best mode applicable in this matter. (*Cooley on Taxation*, 2d ed., 660, 661; *Downer vs. Boston*, 61 Mass. 227; *Piper's Appeal*, 32 Cal. 530; *Wright vs. Boston*, 63 Mass. 233; *Boston vs. Shaw*, 42 Mass. 120; *Goodrich vs. U. & D. T. Co.*, 20 Ind. 119; *Dailey vs. Swope*, 47 Miss. 367; *Williams vs. Cammack*, 27 Miss. 209; 61 Am. Dec. 508; *Wallace vs. Shelton*, 14 La. Ann. 493; *Spencer vs. Merchant*, 100 N. Y. 585; *Excelsior Manufacturing & P. Co. vs. Green*, 39 La. Ann. 455; *Lent vs. Tillson*, 72 Cal. 404.)

Louttit, Woods & Levinsky, for respondent. The statute authorizes the assessment and taking of private property for a private purpose. (*Sedgwick on Constitutional Law*, 2d ed. 446-450; *Anderson vs. Kerns Draining Co.*, 19 Ind. 199; 77 Am. Dec. 63; *People vs. Saginaw*, 26 Mich. 22; *Sadler vs. Longham*, 34 Ala. 329; *Memphis Freight Com. vs. Mayor*, etc., 3 Coldw. 420; *Donnelly vs. Decker*, 58 Wis. 461; *Matter of Reyes*, 72 N. Y. 1; *Burk vs. Ayres*, 26 Hun. 17; *McQuillen vs. Hatton*, 42 Ohio St. 202; *Cheesebrough vs. Commissioners*, 37 Ohio St. 508; *Reeves vs. Wood County*, 8 Ohio St. 333; *Sessions vs. Crunkilton*, 20 Ohio St. 349; *Cooley's Constitutional Limitations*, 5th ed., 633.) The statute authorizes the assessment and taking of private property without reference to actual benefits, and the apportionment is unequal and unjust; consequently the statute is unconstitutional. (*Boston vs. Shaw*, 42 Mass. 130; *Thomas vs. Gain*, 35 Mich. 155; 24 Am. Rep. 535; *Lee vs. Ruggles*, 62 Ill. 427; *Tide Water Co. vs. Coster*, 18 N. J. Eq. 529; 90 Am. Dec. 634; *Howell vs. Bristol*, 8 Bush. 493; *Hammett vs. Philadelphia*, 65 Pa. St. 146; 3 Am. Rep. 615; *Hoboken Land, etc., Co. vs. Mayor*, etc., 36 N. J. L. 291; *Morris and Essex R. R. Co. vs. Jersey City*, 36 N. J. L.

56; *In re Pequest River*, 39 N. J. L. 453; *Kellogg vs. Elizabeth*, 40 N. J. L. 274; *Dyar vs. Farmington Village Corporation*, 70 Me. 528; *In re Washington Avenue*, 69 Pa. St. 352.) The statute is void, because it authorizes the taking of private property without due process of law. (*Cooley's Constitutional Limitations*, 355; *Bank of Columbia vs. Oakley*, 4 Wheat. 244; *Davidson vs. New Orleans*, 96 U. S. 107.) The statute authorizes private property to be assessed and sold to pay for a future, uncertain and contingent improvement. (*In re Drainage of Pequest River*, 39 N. J. L. 433; *In re Fourth Avenue*, 3 Wend. 452; *Const. Cal.*, art. 1, Sec. 14.) The assessment is not limited to the benefits conferred. The statute allows the board of directors and votes of a district to raise the assessments as high as they please, even though the cost of the improvement will exceed the benefits. (*Crawford vs. People*, 82 Ill. 557; *In re Fourth Avenue*, 3 Wend. 452; *Wely on Assessments*, secs. 331-337; *Eel River Draining Association vs. Topp*, 16 Ind. 242; *Dukes vs. Working*, 93 Ind. 504; *Echison Ditch Association vs. Hills*, 40 Ind. 410; *Smith vs. Duck Pond Ditch Association*, 45 Ind., 96.) The statute authorizes the formation of a district and the assessment of lands without giving all the landholders the right of hearing. (*Boorman vs. Santa Barbara*, 65 Cal. 314; *Suare vs. Palmer*, 74 N. Y. 183; 30 Am. Rep. 289; *Rensen vs. Wheeler*, 105 N. Y. 573; *Patten vs. Green*, 13 Cal. 325; *Stockton vs. Whitmore*, 50 Cal. 554; *Cooley's Constitutional Limitations*, 385-386.) The act is the usurpation of judicial powers of the Legislature and the delegation of judicial powers to the Board of Supervisors. (*Cooley's Constitutional Limitations*, 89, 92.) The act, in contravention of the Constitution, delegates to the board of directors of the district and to the electors legislative powers, and grants to a special commission and private individuals power to levy taxes. (*Const.*, art. 19, sec. 13; *Moulton vs. Parks*, 64 Cal. 166; *ex parte Wall*, 48 Cal. 279; 17 Am. Rep. 425; *Houghton vs. Austin*, 47 Cal. 646; *Cooley on Taxation*, 48-50; *Richardson vs. Heydenfeldt*, 46 Cal. 68.) The statute grants special privileges to a certain class of citizens and discriminates in favor of a particular industry. (*Opinion of Judges*, 58 Me. 590; *Brewer Brick Co. vs. Brewer*, 62 Me. 62; 16 Am. Rep. 395; *Ames vs. Port Huron Log Driving, etc., Co.*, 11 Mich. 139; *Const.*, art. 1, sec. 1; art. 4, sec. 25, sub. 17.)

A. L. Hart, *amicus curiæ*, for respondent.

The district formed under the act, for the purpose of irrigating private lands, and thus increasing their productiveness and value, is in every respect a private corporation. (*Wood's Field on Corporations*, sec. 3; 1 *Dillon on Municipal Corporations*, 3d ed., secs. 22-56; *Tou Eyck vs. Canal Co.*, 3 Harr. 300; 37 Am. Dec. 233; *Hanson vs. Vernon*, 27 Iowa, 28; 1 Am. Rep. 215; *Regents of University v. Williams*, 8 Gill & J. 365; 31 Am. Dec. 72; *Allen vs. McKean*, 1 Sum. 278; *Dartmouth College vs. Woodward*, 4 Wheat. 518; *Bailey vs. Mayor*, 3 Hill. 531; 33 Am. Dec. 669; *Rundell vs. D. & R. Co.*, 1 Wall. Jr. 275; *Tinsman vs. Belvidere Delaware R. R. Co.*, 26 N. J. L. 148; 59 Am. Dec. 563; *North Yarmouth vs. Skillings*, 45 Me. 133; 71 Am. Dec. 530; *Ellis vs. Marshall*, 2 Mass. 268; 3 Am. Dec. 49; *Yarmouth vs. North Yarmouth*, 34 Me. 411; 50 Am. Dec. 666; *Payne vs. Treadwell*, 16 Cal. 233.)

W. L. Dudley, for respondent.

The district created under the act is a public corporation. (*Hager vs. Yolo County*, 47 Cal. 223; *Dean vs. Davis*, 51 Cal. 406; *People vs. Williams*, 56 Cal. 647; *People vs. La Rue*, 67 Cal. 526; *Reclamation District vs. Hager*, 56 Cal. 54.) The assessment levied for the revenue purposes of the Act is neither more nor less than taxation, and the amount imposed upon each separate parcel of real property is a tax. (*Emery vs. S. F. Gas Co.*, 28 Cal. 345; *Taylor vs. Palmer*, 31 Cal. 240; *People vs. Whyler*, 41 Cal. 351; *Williams vs. Corcoran*, 46 Cal. 553; *People vs. Austin*, 47 Cal. 353; *Hager vs. Yolo County*, 47 Cal. 222; *People vs. Lynch*, 51 Cal. 15; 21 Am. Rep. 677.) The proceedings for the levying and collection of the assessment, as provided in the act, are re-

pugnant to the Constitution. (Const., Art. 13, secs. 8-9; Art. 14, sec. 1.)

W. T. Baggett, for respondent.

The act is special legislation. It relates to particular localities—districts susceptible of irrigation from a common source. Such legislation is prohibited by subdivisions 10, 28 and 33 of section 25 of Article IV, section 1 of Article XII and section 6 of Article XI of the Constitution of the State. (Earle vs. Board of Education, 55 Cal. 489; Desmond vs. Dunn, 55 Cal. 212; Ex parte Westerfield, 55 Cal. 550; 36 Am. Rep. 47.)

By Foote, C.: This is an application for a writ of mandate to compel the defendant, as the secretary of an irrigation district (under "An act to provide for the organization and government of irrigation districts," etc., approved March 7, 1887, Sess. Laws, p. 29), to sign certain bonds which the applicant proposes to issue under section 15 of that act.

The refusal of the defendant to sign those instruments is based upon the ground that the statute is unconstitutional and void.

One of the distinguished counsel for the defendant contends that the districts contemplated by the act are private corporations, formed for private purposes. To use his own language: "Such an organization has none of the elements of a public municipal body."

While another able attorney on the same side contends that "all the constituents of the public corporation are present, and to that class of corporations a district of the statute must be assigned," and claims that the money sought to be raised under the act is a general tax, and that the system of organization of the corporations prescribed in the act is in conflict with the general plan of constitutional political organization, and that the mode of taxation provided is different from that made necessary by the Constitution for general governmental purposes, and therefore the act is void.

We are inclined to agree with the last mentioned advocate of the defendant's cause, but to the extent only that the district, when organized as provided in the act under discussion, has all the elements of corporations formed to accomplish a public use and purpose, according to the rules of law laid down in Hager vs. Supervisors of Yolo county, 47 Cal. 223; Dean vs. Davis, 51 Cal. 406; People vs. Williams, 56 Cal. 647; People vs. La Rue, 67 Cal. 526; Reclamation District vs. Hager, 66 Cal. 54.

The results to be derived from a drainage law, and one which has for its purpose the irrigation of immense bodies of arid lands, must necessarily be the same as respects the public good; the one is intended to bring into cultivation and make productive a large acreage of land which would otherwise remain uncultivated and unproductive of any advantage to the State, being useless, incapable of yielding any revenue of importance toward the support of the general purposes of State government, by reason of too much water flowing over, or standing upon, or percolating through them.

The other has for its main object the utilizing and improvement of vast tracts of arid and unfruitful soil, desert-like in character, much of which, if water in sufficient quantity can be conducted upon and applied to it, may be made to produce the same results as flow from the drainage of large bodies of swamp and overflowed lands.

Such a general scheme by which immigration may be stimulated, the taxable property of the State increased, the relative burden of taxation as to the whole people decreased, and the comfort and advantage of many thriving communities subserved, would seem to redound to the common advantage of all the people of the State, to a greater or less extent.

It is true that, incidentally, private persons and private property may be benefited, but the main plan of the Legislature, to wit: the general welfare of the whole people, inseparably bound up with the interests of those living in sections which are dry and unproductive without irrigation, is plain to be seen pervading the whole act in question.

This is not a law passed to accomplish exclusive and selfish private gains; it is an extensive and far-reaching plan, by which the

general public may be vastly benefited; and the Legislature acted with good judgment in enacting it.

"If the use for which the property is taken be to satisfy a great public want or public exigency, it is a public use within the meaning of the Constitution, and the State is not limited to any given mode of applying that property to satisfy the want or meet the exigency." (Gilmer vs. Lime Point, 18 Cal. 252.)

"For the most part, the term 'public purposes' is employed in the same sense in the law of taxation and in the law of eminent domain." (Cooley on Taxation, 2d ed., 113.)

So that a law which is for a public purpose, and which may concern the public welfare, which lays an assessment upon property according to approximate quality of benefit, is not unconstitutional because of that feature.

Perhaps to a greater extent than any of the other States, California, speaking through the acts of her Legislature, her court of last resort, and Constitution, seems to have considered the irrigation of lands and the supplying of mines with water as of great public concern. (Code Civ. Proc., sec. 1238; Cummings vs. Peters, 56 Cal. 596; Lux vs. Haggin, 69 Cal., 302-305; Const., art. XIV, sec. 1.)

And in no sense can it be said that under the act in question the assessment to pay the bonds is to be levied or collected in order that one man may take another's property for his own exclusive use.

Therefore, it is evident that the districts in question, as organized under the act, are not private corporations, organized exclusively for the purposes of private gains. They are at least quasi public corporations in the sense that the purpose for which they are to be organized is for the general public benefit.

Nor does it follow that the method of assessments and their collection adopted must be assimilated to and follow exactly the mode provided in the Constitution for the assessment and collection of taxes for general State purposes.

The nature of the assessment is one for local improvements, which, however, eventuate in the advancement of the public good, and such assessments and collections can be lawfully made.

It is "clear that those clauses of the Constitution which provide that taxation shall be equal and uniform, and which describe the mode of assessment and the persons by whom it shall be made, and that all property shall be taxed, have no application to assessments levied for local improvements." (Hager vs. Supervisors of Yolo County, 47 Cal. 222.)

And there was said of the Drainage act, so it may be said of the one in hand relative to irrigation, that a system that has for its object the reclaiming from the desert of vast bodies of land, "may justly be regarded a public improvement of great magnitude, and of the utmost importance to the community." It has been planned by the Legislature on the basis of "dividing a territory to be reclaimed into districts, and assessing the cost of improvements to the lands to be benefited." In none of the States where such a course has been pursued "has the power of the Legislature to cause such improvements to be made in this method ever been denied; nor do we see any tenable ground upon which it can be questioned." (Hager vs. Supervisors of Yolo County, 47 Cal. 222.)

"The fact that the land is situated in more than one county cannot affect the power of the State to delegate authority for the establishment of the reclamation district," or an irrigating district, "to the Supervisors of the county containing the greater part of the lands. Such authority may be lodged in any board or tribunal which the Legislature may designate."

* * * The expense of such works may be charged against parties specially benefited, and be made a lien upon their property. All that is required in such cases is, that the charges shall be apportioned in some just and reasonable mode, according to the benefit received. Absolute equality in imposing them may not be reached; only an approximation to it may be attainable. If no direct or invidious

discrimination in favor of certain persons to the prejudice of others is made, it is not an objection to the mode pursued that to some extent inequalities may arise. It may possibly be that in some portions of the country there are overflowed lands of so large an extent 'or arid lands requiring irrigation,' that the expense of their reclamation should properly be borne by the State. But this is a matter of purely legislative discretion. Whenever a local improvement is authorized it is for the Legislature to prescribe the way in which the means to meet its cost shall be raised, whether by general taxation or by laying the burden upon the district especially benefited by the expenditure." (Hager vs. Rec. Dist., 111 U. S. 705, citing Mobile Co. vs. Kimball, 102 U. S. 691-704.)

The provisions of the act relative to the condemnation of private property, lands, water, etc., for the uses prescribed therein are in harmony with the Constitution and State laws, and in strict consonance with the views of the Supreme Court in the case of Lux vs. Haggin, 69 Cal. 302-305.

There are many other points made by the various counsel for the appellant which a case of some of them at war with others, but time and space do not suffice to advert to them in detail. It seems plain that none of the objections raised to the signing of the bonds by the respondents are tenable. The act under discussion in all respects complies with the various provisions of the State Constitution. We therefore advise that the demurrer to the answer be sustained, and the defendant commanded to sign the bonds by a peremptory writ of mandate.

Belcher, C. C., and Hayne, C., concurred.

By the court: For the reasons given in the foregoing opinion the demurrer to the answer is sustained, and it is ordered that a peremptory writ of mandate issue commanding the defendant to sign the bonds.

(No. 12,954. In Bank, May 31, 1899.)

CENTRAL IRRIGATION DISTRICT, Respondent,
vs. R. DE LAPPE, SECRETARY, ETC., Defendant,
and LEE S. WAKEFIELD, Intervenor, Appellants.

[79 Cal. 351-365.]

Irrigation Districts—Public Corporations—Irrigation districts are public corporations to the same extent as reclamation districts.

Idem—Proceedings for Formation to Be Liberally Construed—The rule that proceedings to divest a person of his property in invitum are to be strictly construed does not apply to proceedings for the formation of irrigation districts. Such proceedings are to be liberally construed to carry out the purposes of the law.

Petition—Order Establishing Boundaries—Description—Rules of Construction—Monuments—False Calls—Parol Evidence—A description by metes and bounds, which would be sufficient in an ordinary deed, is sufficient in the petition and in the order establishing boundaries; and the same general rules of construction apply in each case. Therefore, plain monuments control courses and distances, false calls may be rejected and lines supplied by intentment, and parol evidence is admissible to explain and locate calls.

Bond—Defective Reference to Petition—If the bond required from the petitioners recites two names as petitioners which were not such in fact, but was filed with the petition, and appears that there was no other petition than the one filed, the reference is sufficient for the purposes of identification.

Idem—Condition—Where the statute required a bond conditioned to paying a certain contingency, and the condition of the bond given was to pay in any event. Held that the bond was sufficient.

Idem—Power of the Board to Allow a New Bond to Be Filed in Lieu of a Defective One, and to Continue the Hearing for that Purpose—If the bond filed with the petition is defective merely, and the board has power to allow a new bond to be filed, and to continue the hearing for that purpose, such new bond "accompanies" the petition within the meaning of the statute.

Presentation of Petition—Regular Meeting of Board—Collateral Attack on Regularity of Meeting—Meetings of the board held as and for regular meetings, under an ordinance prescribing the meetings, and which were the only "regular" meetings held for a long period, are "regular" within the meaning of the statute, and objections to the validity of the proceedings on the

passage of the ordinance are immaterial, even if the ordinance was not properly passed, the fact would not have any such collateral and far-reaching effect as to render abortive all the public business transacted at such meeting.

Publication—Slight Mistakes—Slight mistakes in the spelling of names, etc., in the publication are unimportant.

Modification by the Board of the Boundaries of the Proposed District—Including other Lands upon Request of Owners—Excluding Lands which are Embraced Within a Description of Petition and which are Susceptible of Irrigation—The board has power upon final hearing to include within the district lands not included by the petition, upon application of the owners thereof; such application need not be in writing, and it lands which are embraced within the description of the petition, and which are susceptible of irrigation, etc., are excluded by the board, its action is final so far as the validity of the organization of the district is concerned.

Idem—Statement of Reason of the Decision of the Board—It is not necessary that the order establishing the boundaries should state the reasons of the board for excluding lands. Such order is a sufficient decision.

Election Proclamation—Publication—Number of Insertions—The provision that the election proclamation shall be published "for three weeks prior to the election" designates the period of publication only, and not the number of insertions, which latter is left to the reasonable discretion of the board. Instances of reasonable publication.

Election Precincts—When to Be Established—The election precincts are not required to be established thirty days before election. It is sufficient if they are established by the election proclamation, which is required to be published for three weeks.

Form of District Bonds—Bonds of the district drawn so as to be each payable in instalments are in proper form.

Appeal from a judgment of the Superior Court of Colusa county.

The facts are stated in the opinion.

W. F. Goad and W. C. Belcher for appellant De Lappe.

H. M. Alberty and K. Alberty for appellant Wakefield.

Richard Bayne for respondent.

Stanton L. Carter amicus curiae.

By Hayne, C.: This was an application for mandamus to compel the secretary of an irrigation district to sign and seal certain bonds. One of the property-owners of the district was allowed to intervene for the purpose of contesting the validity of the bonds. The court below awarded the mandamus, and the defendant and intervenor appeal.

The district was organized under the act known as the Wright law. (See Laws 1887, p. 29.) This act was held to be constitutional in Turlock Irrigation District vs. Williams, 70 Cal. 360. In that case irrigation districts were likened to districts organized for the reclamation of swamp lands, and the court said that it was inclined to think that they were to be regarded as public corporations. We think that the analogy between the two kinds of corporations is strong. The purpose of the one is to make large bodies of land fit for cultivation by removing the excess of water; and that of the other is to make large bodies of land fit for cultivation by distributing water over them. Their general powers are similar in many respects, and they are organized upon the same plan. It is settled that reclamation districts are public corporations. (Dean vs. Davis, 51 Cal. 410, 411; People vs. Rec. Dist., 53 Cal. 343; People vs. Williams, 56 Cal. 647; Hope vs. Perdue, 62 Cal. 546; People vs. La Rue, 67 Cal. 528.) And we think that irrigation districts must be held to be so to the same extent.

Many objections are taken to the proceedings of the organization of the district. And the argument in relation thereto rests in great part upon the propositions that the proceedings are to be strictly construed. This is put upon two grounds. It is said, in the first place, that the proceedings are for the purpose of divesting the citizen of his property in invitum. It is true that later on provision is made for assessing the property within a district for the purpose of defraying expenses. But no assessments have yet been levied, and none are involved in the case before us. The objections made relate to the organization of the district. The primary purpose of such organi-

zation is to perform certain important public functions. The power of assessment, it is true, is incidental; but in the same way it is incidental to cities and other municipal corporations, strictly so called, for the improvement of streets, etc. And it can no more be said that for this reason proceedings for the organization of irrigation districts are for the purpose of depriving the citizen of his property in invitum than the same could be said of proceedings for the organization of cities and other municipal corporations.

It is said, in the next place, that the district was not created by the Legislature itself, but by or under the supervision of a local body. But all municipal corporations in the State are henceforth to be created in this way. The Constitution provides that corporations for municipal purposes shall not be created by special laws, but shall be organized under such general laws as the Legislature shall provide. (Art. 11, sec. 6.) This necessitates organization under some kind of local supervision. And the general laws which the Legislature has provided require that the organization shall be under the supervision of a local body, much in the same way as in the case of an irrigation district. A petition, "which shall set forth and describe the proposed boundaries of such corporation," is to be presented to the Board of Supervisors of the county, which body is to deal with it much in the same manner as the board is to deal with the petition for the formation of an irrigation district. In fact the phraseology of an irrigation law is so similar to that of a municipal corporation act as to make it evident that the former was modeled upon the latter. (See Laws 1883, p. 94.) Hence, if proceedings for the formation of irrigation districts are to be strictly construed because they are organized under the supervision of a local body, proceedings for the formation of municipal corporations must be so construed for the same reason. But the consequences of of wiping out municipal organizations, perhaps after property rights have grown up, because of some slip in the preliminary proceeding, would be so serious that we cannot think that any court would adopt the strict rule of construction which would require it. It will be time enough to apply such a rule when questions as to the extent of the powers arise. So far as proceedings for the organization are concerned, we think that a reasonably liberal rule of construction should be adopted to carry out the wise purposes of the law.

In the light of this rule we proceed to examine the various objections made:

First—Several objections are taken to the description contained in the petition. They are based upon the requirement of the second section of the act that such petition "shall set forth and particularly describe the proposed boundaries of such districts." It is probable that this provision requires a description by metes and bounds, for it is "the boundaries" which are to be described and not merely the district. But we think that a description by metes and bounds which would be sufficient in an ordinary deed is a compliance with the provisions. "The same construction that is given to grants is given to statutes which prescribe the boundaries of incorporated territories." (Cold Spring Iron Works vs. Tolland, 9 Cush. 496.) It has even been held that a more liberal rule should be applied. (Hamilton vs. McNeil, 13 Gratt. 394.) But at all events a description by metes and bounds which would be good in a deed is sufficient in the petition.

Now, the main part in regard to the description is that it cannot be made to close upon itself. The learned counsel say that "the only way in which this could be done would be to change the distance '200 feet' in line 10 of folio 14 to '2000 feet,' and '540 feet' in line 6 of folio 13 to '5400 feet.'" But if this is necessary, we think that it can and should be done upon the data furnished by the petition itself. The first call referred to is as follows: "Thence south 34 deg., east 200 feet to stake

203." For anything it appears to the contrary, this stake is a perfectly plain monument; and being so, it must control the statement of the distance. (Mills vs. Lux, 45 Cal. 273; Penry vs. Richards, 52 Cal. 672.) If, therefore, it is 2000 feet from the point of departure the call for 200 must be rejected. False calls may be rejected and lines supplied by intentment in the description of the boundaries of a municipal corporation. (In re Inhabitants of Ipswich, 13 Pick. 431.) A false call may be rejected even in a tax deed. (Bosworth vs. Danzén, 25 Cal. 299.) The objection to the call for "540 feet" is to be disposed of in a similar way.

It is also contended that the starting point and certain other calls in the description are too indefinite. But we cannot say from the face of the paper that this is so. And the evidence to explain and locate the calls (which was clearly admissible: Reamer vs. Nesmith, 34 Cal., 626) makes them sufficiently definite.

Similar objections are made to the description in the order of the board establishing the boundaries of the district and similar answers apply.

Second—It is contended that a proper bond was not filed with the petition. The provision of the act is that "the petitioners must accompany the petition with a good and sufficient bond, to be approved by the said Board of Supervisors, in double the amount of the probable cost of organizing such district, conditioned that the bondsmen will pay all said costs in case said organization shall not be effected * * * when such petition is presented, the said Board of Supervisors shall hear the same," etc. (Sec. 2.)

The petitioners presented and the board approved a bond, which is claimed to be insufficient in form. The particulars in which it is said to be insufficient are the following: It is said, in the first place, that the recital in the bond misdescribes the petition. The petition was signed by sixty-four persons, among whom were J. A. Sutton, James McDermott, George B. Harden, George M. Sutton and P. R. Garnett. The recital in the bond is that, "whereas, J. A. Sutton, James McDermott, George B. Harden, George M. Sutton, P. R. Garnett, N. D. Rideout, A. J. Tully, and others, their associates, propose to present herewith" a petition, etc. Rideout and Tully did not sign the petition. The argument is that the petition filed does not correspond to the one referred to in the bond, and consequently that there was no bond upon that petition. The recital, however, is not a petition actually presented, but of one proposed to be presented. The bond did, in fact, accompany this petition. And we think that this circumstance, coupled with the recital, is sufficient to identify the document.

In the next place it is said that the bond was not conditioned as required by the act. The condition was that the bond should be void "if said obligors or bondsmen shall pay all the costs," etc., while the condition required by the statute is that the bondsmen shall pay the costs "in case said organization shall not be effected." The difference is, therefore, that the bond given provided that the bondsmen should pay the costs in any event, while the statute only requires that they should pay in a certain contingency. We think, however, that the bond may fairly be said to include the provision required by the statute, and that it is not vitiated by including a something that was not required. And the use of the singular number in the phrase "if said obligor or bondsmen shall pay," etc., is unimportant.

But at most the bond was defective merely. And, if it be assumed for the purposes of the case that the giving of a bond was jurisdictional, we think that the board had power to allow a new one to be given before taking action on the petition. The petition was presented, pursuant to notice, on October 10th; and when the matter came up on that day the board made an order allowing a new bond to be filed and continuing the hearing until a future day. A bond free from objection was

fled and the board then proceeded with the hearing. We think that this course was within the power of the board. No time is fixed for the presentation of a petition. It is to be presented at a regular meeting pursuant to notice. And the bond "must accompany the petition." Neither the petition nor the bond need be filed before the petition is presented; and the hearing and the action of the board in the matter may be at the same meeting, although power is expressly given to adjourn for a certain time. It is sufficient, therefore, if the bond be given on the day of the hearing. And we think it clear that there was power to adjourn the hearing so as to allow a proper bond to be filed. Such a bond may be said to "accompany" the petition in the sense of the statute. Even in the case of an appeal bond it is held, prior to the enactment of any statute on the subject, that where a bond had been given which was defective merely, the defects could be cured by giving a new bond in the Supreme Court. (See cases in Hayne on New Trial and Appeal, p. 651.)

Third—It is objected that the petition was not presented at a lawful meeting of the board. The act provides that the petition "shall be presented at a regular meeting of said board." A similar provision is in the Municipal Corporation act. (Laws 1883, p. 94.) In relation to meetings of Boards of Supervisors, the County Government act has the following: "The Board of Supervisors must, by ordinance, provide for the holding of regular meetings of the board at their respective county seats." In pursuance of this provision, the board, on April 11, 1885, passed an ordinance fixing the times for its regular meetings. Meetings were held under this ordinance for nearly two years and up to and including the presentation of the petition. The objections made go back to the validity of this ordinance. It is said that it was not properly recorded in the Ordinance Book, but its recording in that book has been held to be not essential to its validity. (People vs. Cole, 70 Cal., 60.) It is further said that the vote of one of the Supervisors was not shown by the entry in the minutes or by publication. But the meetings were held under this ordinance for a long period as and for regular meetings, and they were the only meetings of the kind which were held. And we do not think that the question of their regularity can have any such far-reaching and collateral effect as to render abortive all the public business that has been transacted during a series of years.

Fourth—It is contended that the petition was not published. The objections in this regard are founded on slight mistakes in the spelling of some of the names, which are entirely unimportant, and of certain defects in the description, which are disposed of by what is said under the first head.

Fifth—it is urged that the board had no power to modify the boundaries of the proposed district in the way it did. What the board did was in the first place to include in the district certain lands not included by the petition, upon the verbal request of the owners, and, in the second place, to exclude from the district certain lands included by the petition. The provision of the act under which this was done is as follows:

"The said board, on the final hearing, may make such changes in the proposed boundaries as they may find to be proper, and shall establish and define such boundaries; provided that said board shall not modify such boundaries so as to except from the operation of this act any territory within the boundaries of the district proposed by said petitioners which is susceptible of irrigation by the same system of works applicable to the other lands in such organized district; nor shall any lands which will not, in the judgment of said board, be benefited by irrigation by said system be included within such district; provided that any person whose lands are susceptible of irrigation from the same source shall, upon application of the owner to said board, be entitled to have such lands included in said district." (Sec. 2.)

(a) The objection to the inclusion of lands not embraced in the petition is that the appli-

cation of owners (which is admitted to have been made) was not in writing. But although it would be more satisfactory and prudent to make such applications in writing, we see nothing in the act which requires a writing; and we do not think that the court is authorized to superadd such a requirement.

(b) The objection to the exclusion of lands from the proposed boundaries is based upon the proviso that "said board shall not modify such boundaries so as to except from the operation of this act any territory within the boundaries of the district proposed by said petitioners which is susceptible of irrigation by the same system of works applicable to the other lands in such organized districts." The appellants offered evidence to show that the excluded lands were in fact susceptible of irrigation by the same system of works as the other lands; and such evidence was excluded, on the ground that the judgment of the board as to the matter was final. We think that this ruling was right. It is to be observed that no power is given to the board to include lands which are not included by the petition, except upon request of the owners. And with reference to excluded lands, it is possible (although we express no opinion upon the point) that the owners could, upon request and a proper showing in some appropriate proceeding, have their lands reincluded. But, so far as the validity of the organization of the district is concerned, we think that the judgment of the board cannot be contradicted as is attempted here. It is clear that this would be so in the absence of the proviso quoted. (People vs. Hager, 66 Cal. 60; People vs. Riverside, 70 Cal. 461.) And, from the nature of the question, we think that the proviso must be considered merely as a rule for the guidance of the board; and that, so far as the validity of the district is concerned, their decision is as conclusive as if the proviso had not been inserted.

It is objected to this view, however, that the records simply show what the action of the board was, and do not show the grounds or reasons upon which such actions proceeded; or, as counsel put it, that there was any decision of the board upon the question of the application of the system of works to the excluded lands. But the order fixing and establishing certain boundaries, excluding certain of the lands included by the petition, is certainly a decision as to where the boundaries shall be; and there is nothing in the act which requires the board to state why it fixes the boundaries in any particular place. And we think that it may be safely laid down as a general proposition that the reasons or grounds of the action of any tribunal or body, whether legislative or judicial, need not be stated unless the law expressly so requires. It is to be observed that there is a clear distinction between cases of the statement of the reasons or grounds of the action which a tribunal is authorized to take, and cases where the power to act depends upon the existence of antecedent conditions. We think that this case belongs to the former class.

Sixth—it is objected that the proclamation for the election on the question of the organization of the district was not published as required by the act. The objection is based partly on small inaccuracies in the description, which have been already considered, partly on unimportant mistakes in the spelling of names, and partly on the alleged ground that the proclamation was not published for "three weeks prior to the election." These words, we think, simply indicate the time during which the notice is to be published, and not the manner of the publication. (In re Cunningham, 73 Cal. 558, 559.) And nothing being said about the number of publications, we think that this matter was left to the discretion of the board. The board ordered that the publication be made in a weekly newspaper "as often (or for four insertions) as the same may be published between this date and the said day of election." This order was made on October 28th. The election was on November 22d, and the proclamation was published on October 29th, and on the 5th, 12th and 19th of November. This, we think, was sufficient.

Seventh—It is said that the voting precincts were established less than thirty days before the election. The Irrigation act does not say

in terms when the young precincts shall be established. It says, however, that "such election shall be conducted in accordance with the general election laws of the State." And by the general election laws the voting precincts must not be established less than thirty days before the election.

We are inclined to question whether the "conducting" of an election necessarily includes something which cannot take place within thirty days before the election day. But, assuming that it does, the evident meaning is that the election shall be conducted in accordance with the general laws, except as otherwise provided in the act itself. The act provides that "for the purpose of the election above provided for the said Board of Supervisors must establish a convenient number of election precincts in said proposed district, and define the boundaries thereof, which said precincts may thereafter be changed by the board of directors of such district." (Sec. 3.) This provision does not say when the precincts are to be established. But we think it cannot be the meaning that the board is to establish them thirty days before the election. For the notice of election is to be, or at least may be, given at the time the order establishing the boundaries of the district is made (Sec. 3); and only three weeks' publication of the same is required. Hence, the election may take place within less than thirty days from the time when it is first known where the boundaries of the district are to be. Consequently, the argument made would require the voting precincts to be established before it was known where the district was to be or what it was to include. No such absurd construction will be adopted. The time for the establishment of the precincts seems to be left to the discretion of the board. They were established by the election proclamation, which was published for at least three weeks, and this we think was sufficient.

Eight—It was finally objected that the bonds were not in proper form. The provision of the act is as follows:

"Said bonds shall be payable in gold coin of the United States, in installments, as follows, to wit: At the expiration of eleven years, not less than 5 per cent of said bonds; at the expiration of twelve years, not less than 5 per cent; at the expiration of thirteen years, not less than 7 per cent; at the expiration of fourteen years, not less than 8 per cent; at the expiration of fifteen years, not less than 9 per cent; at the expiration of sixteen years, not less than 10 per cent; at the expiration of seventeen years, not less than 11 per cent; at the expiration of eighteen years, not less than 13 per cent; at the expiration of nineteen years, not less than 15 per cent, and for the twentieth year a percentage sufficient to pay off said bonds." (Sec. 15.)

The bonds here involved were drawn so as to make each one payable in installments. And the objection is that a proper construction of the act requires that a certain number of bonds should be payable in eleven years, a further number in twelve years, and so on. We think, however, that the bonds were in proper form. The phrase "A bond payable in installments" is clear, and can only mean one thing. Is the meaning changed by putting it in the plural and making it "bonds payable in installments"? But there are other provisions of the act which make the intention clear. The sixteenth section provides "that the board may sell said bonds from time to time in such quantities as may be necessary and most advantageous," etc. It may happen, therefore, that only a portion of the bonds are sold. Now, for illustration, we will suppose that the bonds were issued on appellant's theory and that only those payable at the end of eleven years are sold. In such case the only bonds outstanding would be the eleven-year bonds; for a bond which has not been sold, or, in other words, not issued, cannot be said to be "outstanding." The whole amount of the principal of such bonds would be due and payable at the end of eleven years. How would it be paid? The twenty-second section provides, in substance, that at the expiration of the tenth year the board of directors shall make an assessment "in the follow-

ing percentage of the principal or the whole amount of bonds then outstanding, to wit: For the eleventh year, 5 per cent," etc. This is the only provision for raising money to pay the principal of said bonds. It would therefore result, upon the appellant's theory, that, although the whole amount of the principal of the eleven-year bonds would be due and payable, only 5 per cent thereof could be paid. And similar results would follow as to the others; while, as the bonds were drawn, 5 per cent of the whole amount of the principal of the bonds "then outstanding" would be sufficient to pay off each installment of the principal as it became due. It may be that the Legislature supposed that there was a good reason for making each bond run in part for the whole twenty years.

As is well known, a bond for a long term is more salable (other things being equal) than a bond for a short term. And the object may have been to help the sale of the short bonds by incorporating them with the long ones. However this may be, we think that the intention to have the bonds drawn as the respondent has drawn them is sufficiently expressed.

The other matters do not require special notice. We therefore advise the judgment appealed from to be affirmed.

Foote, C., concurring.

Belcher, C. C., being disqualified, took no part in this decision.

The Court: For the reasons given in the foregoing opinion, the judgment is affirmed.

[No. 14038.]

HENRY J. CRALL, APPELLANT, VS. BOARD OF DIRECTORS OF THE POZO IRRIGATION DISTRICT, RESPONDENT.

[Filed December 15, 1890. 87 Cal.]

Irrigation Districts.—Act of March 7, 1887, providing for organization and government of irrigation districts is constitutional.

Irrigation Districts formed under Act of March 7, 1887, are public corporations.

Notice by publication or posting of petition for confirmation of the proceedings of the board of directors of an irrigator district is sufficient to give the court jurisdiction, and personal notice to members of the district is unnecessary.

Judgment of Confirmation of the proceedings of board of directors of an irrigation district, based upon a notice by publication of a petition for confirmation, is conclusive and binding upon members of the district and all the world until reversed on appeal or set aside in some direct proceeding instituted for that purpose.

Appeal from a judgment of the Superior Court of Stanislaus county.

The facts necessary to an understanding of the case are so clearly stated in the opinion of the Court that any further recital of them is unnecessary.

L. J. Maddux, for the appellant, contended:

First—That the demurrer to the answer should have been sustained; that a judgment of confirmation did not bar one who did not appear therein; that the plaintiff was entitled to attack the petition of the Board of Supervisors for the organization of the district; that a proper petition was essential to jurisdiction. (Mulligan vs. Smith, 59 Cal. 209; Liebman vs. The City, 11 Sawyer, 147; Ziegler vs. Hopkins, 117 U. S. 633.)

Second—That the plaintiff was not served with process in the confirmation, did not have due process of law. The only notice plaintiff had was the publication in the paper; that a personal notice was essential. (Pennoyer vs. Neff, 95 U. S. 714; Stuart vs. Palmer, 74 N. Y. 191; Taylor vs. Porter, 4 Hill, 146; Westvelt vs. Gregg, 2 Kern, 209; Powell's Appeal, 29 Mich. 376; State du Lac, 42 Wis. 29.) Wright & Hazen and A. L. Rhodes, for the respondent, argued:

First—That the court had jurisdiction of the subject-matter of the special proceeding; that the Legislature could grant and the Superior Court could exercise jurisdiction in this proceeding of all the matters expressly granted to it by the confirmation act. (Lent vs. Tillson, 72 Cal. 404.)

Second—That the court acquired jurisdiction of the plaintiff in this case; that notice may be given by publication and posting, and the court acquires jurisdiction so as to be able to adjudge that the proceedings were legal and valid. (Davidson vs. New Orleans, 96 U. S.

104; Riley vs. Lancaster, 39 Cal. 354; Ellet vs. Foote, 39 Cal. 440; Mayo vs. Faley, 40 Cal. 282; State vs. McGlynn, 20 Cal. 233; Irwin vs. Scriber, 18 Cal. 499; Boyd vs. Blankmann, 29 Cal. 19; Halleck vs. Moss, 22 Cal. 266; People vs. Hager, 52 Cal. 171; Barrett vs. Carney, 33 Cal. 536; Friedlander vs. Loucks, 34 Cal. 23.)

Third—That the judgment in the special proceedings is final and conclusive against all persons interested in the district or its bonds. (Lent vs. Tillson, 72 Cal. 404; San Francisco vs. Certain Real Estate, 42 Cal. 519.)

By Belcher, C. C.: An irrigation district, known as the Poso irrigation district, was organized by the Board of Supervisors of Kern county, under the act passed by the Legislature of this State and commonly called the Wright Act. (Stats. 1887, p. 29.) A board of directors for the district was elected, and the members qualified and entered upon the discharge of their duties. In performance of the duties prescribed by the act, the board estimated and determined that the amount of \$500,000 was necessary to be raised for the purpose of constructing necessary irrigating canals and works, and acquiring the necessary property and rights therefor, and otherwise carrying out the provisions of the act. Thereupon the board called a special election, to be held on a date named, at which was submitted to the qualified electors of the district the question whether or not the bonds of the district should be issued in the amount so determined. Notice of the election was given and published in the manner and for the time prescribed by the act, and the election was held pursuant to the call. When the returns of the election were canvassed it was found and determined that a majority of the votes cast were in favor of the issuance of the bonds, and thereupon the board ordered that bonds of the district, to the amount of \$500,000, be immediately prepared and issued in the manner and form provided by the act. Subsequently the board made another order, that the bonds, to the amount of \$200,000, be offered for sale.

All of the foregoing proceedings were apparently regular, and in compliance with the provisions of the Wright act.

After the entry of the order for the sale of the bonds, the board of directors, under the act supplemental to the Wright act, "and to provide for the examination, approval and confirmation of proceedings for the issue and sale of bonds issued under the provisions of said act" (Stats. 1889, p. 212), commenced a special proceeding in the Superior Court of Kern county for the purpose of having all the proceedings for the organization of the district and the issue of the bonds judicially examined, approved and confirmed. A petition for confirmation, in due form, was filed, and thereupon the court fixed a day for the hearing of the petition, and ordered notice to be given and published for the time and in the manner prescribed by the act; and in pursuance of this order notice in proper form was duly given and published.

At the time appointed the matter was heard upon oral and documentary evidence, and thereafter the court filed its findings of fact and conclusions of law and entered its judgment, approving and confirming all of the proceedings for the organization of the district and for the issue of bonds; and it "further ordered, adjudged and decreed that the said Poso irrigation district, ever since its organization as aforesaid, has been and now is a duly and legally organized irrigation district, and that it possesses full power and authority to issue and sell from time to time the bonds of said district to the amount of \$500,000."

The plaintiff herein did not appear in the confirmation proceedings, but after the entry of the judgment of confirmation he commenced this action to obtain a decree enjoining the sale of the bonds.

For the purpose of showing that the plaintiff is a proper party to bring the action, the complaint alleges that he is the owner of lands within the district and that they will be subject to assessment to raise money to pay the bonds if they should be sold. It then—after stating facts sufficient to show that there was in form, a regular organization of the district

and an apparent compliance with the provisions of the statute for the issue of bonds, proceeds to allege that the board of directors has no power to issue or sell the bonds, because:

First—The petition which was presented to the Board of Supervisors for the organization of the district was not, in truth, signed by fifty freeholders, nor by a majority of the freeholders then or at any time owning land within the proposed district, and that not more than thirty of the persons whose names purport to have been signed to the petition ever were freeholders within the district.

Second—The notice of the time and place, when and where the election for the organization of the district would be held was not in fact published for the full period prescribed by law.

Third—The lands of plaintiff were not susceptible of irrigation by the same system of works applicable to the other lands of the district, and they would not be benefited by irrigation thereby.

Fourth—The notice of the special election upon the question whether bonds should be issued was not published nor posted for the full period prescribed by law.

Fifth—The Board of Directors wrongfully and unlawfully estimated and determined that it was necessary to raise \$500,000 for the purposes of the district when in fact it was necessary to raise only \$200,000 for those purposes.

The answer of the defendant sets up the judgment of confirmation in bar of the action, and is, in effect, that the matters of irregularity and illegality stated in the complaint were conclusively determined by that judgment. To the answer the plaintiff filed a general demurrer, and thereupon, the vital question in the case being whether the plaintiff was estopped by the judgment of confirmation, the parties stipulated that final judgment should be rendered in accordance with the decision upon the demurrer. The court overruled the demurrer and rendered judgment for the defendant. From that judgment the plaintiff appeals.

There can no longer be any question that the Wright act is constitutional, and that irrigation districts organized under its provisions, like reclamation districts, are public corporations. (Turlock Irrigation District vs. Williams, 76 Cal. 360; Central Irrigation District vs. De Lappe, 79 Cal. 351.) The districts are authorized to construct irrigation works, and to that end to issue bonds bearing interest at the rate of 6 per cent per annum, the interest payable semi-annually and the principal in installments extending over twenty years. These bonds are, from time to time, to be offered for sale, and to be sold to the highest responsible bidder, provided that not less than 90 per cent of their face value shall be accepted. And they are to be paid, interest and principal, by revenue derived from an annual assessment upon the real property of the district.

It is a matter of every day observation that bonds bearing such a rate of interest, and about whose validity and payment at maturity there is no question, can be readily sold for considerable more than their face value, while bonds which are liable to be assailed and questioned years after their issue by any one who is required to contribute to their payment, are reluctantly taken at any price. It was doubtless for the purpose of settling all these matters in advance, and thereby making the bonds of irrigation districts more readily salable, and at better prices than they would otherwise command, that the Legislature passed the Confirmation act, providing that the district

might, before offering any of their bonds for sale, have all questions affecting their validity judicially and finally determined.

The confirmation proceeding is denominated in the act a special proceeding, and it is clearly in the nature of a proceeding in rem, the object being to determine the status of the district and its power to issue valid bonds. The fifth section of the act is as follows:

"Upon the hearing of such special proceeding the court shall have power and jurisdiction

to examine and determine the legality and validity of, and approve and confirm, each and all of the proceedings for the organization of said district under the provisions of the said act (Wright act), from and including the petition for the organization of the district, and all other proceedings which may affect the legality or validity of said bonds, and the order for the sale, and the sale thereof." (Stats. 1899, p. 212.)

That the Legislature had power to pass an act to accomplish the purposes intended by this act cannot be questioned. Nor is it pretended that the appellant did not have notice of the confirmation proceedings, or that he was in any way or for any reason prevented from appearing therein and raising all the objections which he now seeks to raise. The contention is simply that no process, issued in those proceedings, was served on him personally, and hence that he was not obliged to appear, and his rights are not barred by the judgment, but he is at liberty now to make "any attack upon the proceedings for the issue of bonds, including the proceedings for the organization of the district, that he could have made had there been no judgment of confirmation." To hold otherwise, it is claimed, would have the effect of depriving him of his property without due process of law.

It will be observed that the question is not whether the valuation of the land for the purposes of assessment can be made and definitely fixed without further notice to the land owner, nor whether the assessment can be collected without further notice; but it is simply whether the notice by publication and posting was sufficient to give the court jurisdiction to determine that the proceedings taken for the organization and on behalf of the district were such as will enable the district to create a valid debt to be paid by the levy of assessments in the manner provided by the Wright act.

In our opinion the contention of appellant cannot be sustained. It was not necessary, we think, that personal service be made upon all or any of the landowners of the district in order to give the court jurisdiction and power to render a judgment, valid and binding as against them and all the world, upon all the questions involved in the case. And this view seems to be well supported by the authorities.

In *Pennoyer vs. Neff*, 95 U. S. 727, a case largely relied on by appellant, the Supreme Court of the United States held that where the entire object of the action is to determine the personal rights and obligations of the defendants, that is, where the suit is merely in personam, constructive service by publication upon a non-resident of the State is sufficient for any purpose, and at the same time declared that "such service may answer in all actions which are substantially proceedings in rem."

In this State, constructive notice, given in such a way as is provided by statute, of proceedings for the probate of wills and of all proceedings in the administration of estates of decedents, has always been regarded as sufficient. In *State vs. McGlynn*, 20 Cal. 233, it was held that the probating of a will was a proceeding in rem, and that the decree admitting a will to probate was conclusive, not only upon the parties who were before the court, but upon all other persons. In its opinion the court quotes the following language, used by the Supreme Court of Vermont in *Woodruff vs. Taylor*, 20 Vt. 65: "The probate of a will I conceive to be a familiar instance of a proceeding in rem in this State. The proceeding is in form and substance upon the will itself. No process is issued against any one, but all persons interested in determining the state or condition of the instrument are constructively notified, by a newspaper publication, to appear and contest the probate; and the judgment is, not that this or that person shall pay a sum of money or do any particular act, but that the instrument is or is not the will of the testator; it determines the status of the subject matter of the proceeding. The judgment is upon the thing itself, and when the proper steps required by law are taken the judgment is conclusive, and makes the instrument, as to all the world (at least so far as the property of the

testator within this State is concerned, just what the judgment declares it to be." (See, also, in matter of the will of Warfield, 22 Cal. 51; *Rogers vs. King*, 22 Cal. 72; *Halleck vs. Moss*, 22 Cal. 266; *Irwin vs. Scriber*, 18 Cal. 500.)

So in an action brought against the land and all owners and claimants, known and unknown, to recover a street assessment, it has been held that constructive service of process may be sufficient to authorize the court to render a judgment which is conclusive and binding upon all the world, until reversed on appeal or set aside by some direct proceeding brought for that purpose. (*Mayo vs. Ah Loy*, 32 Cal. 477; *People vs. Doe*, G. 1034, 36 Cal. 220; *Eitel vs. Foote*, 39 Cal. 439.)

So, too, in insolvency proceedings, it has been held that notice by publication is sufficient to give the court jurisdiction over the subject matter and the parties. (*Bennett vs. His Creditors*, 22 Cal. 33; *Friedlander vs. Loucks*, 34 Cal. 18; *Arnold vs. Kahn*, 67 Cal. 472.)

Many other analogous cases might be cited, but we think the above sufficient.

The decision in *Munigan vs. Smith*, 59 Cal. 206, cited by appellant, is not in conflict with what has been said. That case was ejection to recover possession of a lot of land, which had been sold to pay an assessment under the Montgomery-avenue act. The act required that a petition, signed by a majority of the owners in frontage of the property to be charged with the costs of the improvement, be presented to the Mayor; that a board of public works be then organized, and that it make a report showing the benefits and damages resulting from the improvement to each piece of property within the district to be assessed; and that the report be presented to the County Court for approval and confirmation.

This court, on page 231, said: "In no part of the statute does it appear that any provisions were made for any notice to be given to property-owners of the proceedings authorized to be taken before the Mayor, or of the proceedings by the board of public works, or in the county court, against the property declared to be benefited by the opening of the avenue. No personal notice was, in fact, given to the defendant of the presentation of the petition, or of any of the acts of the board. Neither the Mayor nor the board was required to give notice until the board had completed the report of its work. Then the statute required it to publish a notice for twenty days in two daily newspapers printed and published in the city and county of San Francisco, that the report would be open for the inspection of all parties interested at the office of the board every day during ordinary business hours for thirty days.

And again on page 232: "Nowhere in the statute is the petition made part of the report, or of the data or documents used in making it. Nor is it anywhere required that the board or the Mayor shall return it to the court, or file it there or elsewhere. The court had, therefore, no jurisdiction of the petition, no power to adjudge upon its sufficiency and validity so as to conclude the defendant. And in adjudicating upon the report itself the court acquired no jurisdiction of the person or property of the defendant, so as to determine his rights. Both, it is true, were within the territorial limits of the jurisdiction of the court, but no actual or substituted process of law had been served upon one or the other."

It was accordingly held that the court below rightly admitted evidence to show that the petition was not signed by the owners of a majority in frontage of the lands assessable for the opening of the avenue.

On the other hand, our attention is called to *Lent vs. Tillson*, 72 Cal. 404, in which was involved the validity of the proceedings taken for the widening of Dupont street, in the city and county of San Francisco, under the provisions of an act passed for that purpose. It was held in an able and elaborate opinion by Justice Temple that notice by publication, as required by the act, was sufficient to constitute due process of law, by which all persons whose rights were affected by the proceedings

and before the County Court were brought into court, and was sufficient from that time on to charge them with notice with everything done and to uphold the final order of the court.

We conclude that the court below had jurisdiction in the confirmation proceedings of the subject matter and the parties, and that its judgment is conclusive and binding upon the defendant and all the world until reversed on appeal or set aside by some direct proceeding instituted for that purpose.

We therefore advise that the judgment be affirmed.

Vanciliff, C. and Hayne, C., concurred.

By the court—For the reasons given in the foregoing opinion the judgment is affirmed.

[No. 13988.]

BOARD OF DIRECTORS OF THE MODESTO IRRIGATION DISTRICT VS. TREGEE.

[Filed March 19, 1891. 88 Cal.]

Notice of petition to confirm acts of board of irrigation directors in issuing bonds need not be personal to every person interested in the district, but may be by general notice by publication in some form.

Notice of petition to confirm acts of board of irrigation directors in issuing bonds, provided for in section 5 of act of March 16, 1889, is sufficient.

Notice of petition to confirm acts of board of irrigation directors in issuing bonds need not state the prayer of the petition.

Notice of petition to confirm acts of board of irrigation directors in issuing bonds is sufficient if it contains everything necessary to a substantial compliance with the statute.

Proceedings not set out in petition on file for the confirmation of the acts of an irrigation board in issuing bonds cannot be confirmed where the original petition was amended and no new notice of the amended petition was published; that the persons contesting the petition had notice of the amended petition is not sufficient.

Decree confirming all orders alleged in the original and amended petitions to confirm acts of a board of irrigation directors in issuing bonds is not void for want of jurisdiction as to the orders set out in the original petition, merely because no new notice has been given of the filing of the amended petition; therefore, where the original petition alleges orders and resolutions directing the issuance of bonds to the extent of \$400,000, and the amended petition alleged orders for the issuance of \$800,000 worth of bonds, and no new notice of the amended petition is filed, a decree confirming the proceedings of the board will be upheld, so far as it confirms the issuance of the \$400,000 worth of bonds.

Land of city or town may be included within an irrigation district in a proper case. This power is not affected by the fact that there are portions of the city or town not directly benefited.

Including a town within an irrigation district is a question whose decision has been committed to the several Boards of Supervisors, and their discretion is not subject to the control of any court.

Evidence that lots in a city included in an irrigation district were not benefited is not competent in a petition to confirm the proceedings of the board of directors in issuing bonds.

Evidence that city was included in irrigation district for the purpose of carrying out the scheme of organization against the wishes of the farmers outside of the city is not competent in a petition to confirm the proceedings of the board in issuing bonds, unless the facts constituting the fraud have been fully pleaded.

Confirmation of acts of directors of irrigation district in issuing bonds will not be refused because after the resolution to issue the bonds the board had ordered a portion of the district to be included, when at the time notice of the bonds had issued, and there was no contract for their issuance.

Refusal of trial de novo on filing amended petition for confirmation of the proceedings of board of irrigation directors issuing bonds is not an error where all the evidence that was taken was applicable to the issues formed by the amended petition.

Notice of election for issuance of bonds, required by section 5 of act of March 7, 1887, need not be given on a special election held under section 15 of that act.

Petition to confirm proceedings of board of irrigation directors will lie as soon as any resolution has been adopted for the issue and sale of bonds, and it is not necessary to wait until the bonds have been actually issued.

Exclusion of part of irrigation district does not terminate the authority given to the directors to

issue bonds, where, at the time of the exclusion, the district had no debt and no objection was made to such exclusion by any person.

This was a special proceeding under the statute of March 16, 1889, for the purpose of obtaining the decree of the court approving and confirming the proceedings had for the organization of the Modesto irrigation district, and for the issuance and sale of the bonds of the district.

The petition was filed on the 1st day of August, 1889. The court thereupon made an order fixing the 24th day of August for the hearing of the petition, and required that the clerk should give the notice of the hearing in the manner prescribed by law. In pursuance of this order the clerk gave and published notice. On August 21st the defendant appeared and demurred to the petition. The demurrer was overruled. Thereafter the defendant filed his answer, and on the issues thus raised the cause was tried. When the taking of the testimony was concluded, and during the argument, the respondents asked and obtained leave to amend the petition to make it uniform to the evidence taken. Leave was then granted to the defendant to answer such amendments as might be made, and on the 18th day of November, 1889, the defendant filed his answer to the petition as amended. The defendant asked that the case be tried de novo, but the demand was refused. The defendant was, however, permitted to offer evidence in support of any new matter in his amended answer. The court gave judgment for the plaintiff, and the defendant appealed. Further facts appear from the opinion.

George W. Schell, C. W. Easton and Thomas B. Bond, for appellant, contended:

That a general notice to the world was necessary, and that a limited notice was insufficient (Cooley on proceedings in rem; Cooley on Const. Lim., 402) and that the notice must be served; that the people had no notice of the amended complaint, and that the judgment was therefore without due process of law (Thompson vs. Johnson, 60 Cal. 291); that Tregée had a right to raise this objection; that to give judgment without notice was unconstitutional; that the Supervisors violated the statute by including the city of Modesto in the district (Stats. 1837, p. 30, sec. 2).

Further, that evidence should have been allowed to show that the Supervisors included the city of Modesto for the purpose of obtaining voters to force outside farmers into the corporation (Spring Valley Water Works vs. San Francisco, 82 Cal. 286); that the 25,000 acres were improperly excluded from the district; that the court erred in holding that the order of July 31, 1889, for \$400,000 was an order for a part of the same bonds ordered to be issued by an order of the Board of Supervisors made June 3, 1888; that the notice of the hearing of the original petition did not state the prayer of petition as required by the statute; that the court should have tried the case de novo after the filing and serving of the amended answer and the answer thereto (C. C. P. 67; Kentfield vs. Hayes, 57 Cal. 409; Barber vs. Reynolds, 33 Cal. 501); that no notice of an election for the issuance of bonds was posted in the office of the board fifteen days before the election, as required by section 5 of act of March 7, 1887; that the action was prematurely brought, and that the proceeding could not be maintained, because no bonds had in fact been issued (Stats. 1889, p. 212; Stats. 1887, p. 35, sec. 15); that if the Legislature intended by the act of February 16, 1889, p. 21, to bind the new district by an election held by the old district ordering the issuance of the bonds, the act to that intent is in conflict with secs. 12 and 13 of Art. XI of the Constitution of California, and sec. 10, Art. I of the Constitution of the United States, (Turlock Irrigation District vs. Williams, 76 Cal. 370.)

C. C. Wright, attorney for the respondent, admitted that the proceeding was one in rem, but contended:

First—That the notice was sufficient. (Cooley on Const. Lim., 4th ed., p. 503; Lent vs. Till-



Rock work on Tulare canal.

son, 72 Cal. 404; Estate of Johnson vs. Tyson, 15 Cal. 237; Snyderham et al. vs. Pitcher & Poole, 1 Cal. 280; Rich vs. Starbuck, 45 Ind. 312; Wade on Notice, sec. 1203.

Second—That the defendant would not be heard to complain that the people of the district had no notice of the amended complaint. (Thompson vs. Johnson, 60 Cal. 292; McGray vs. Pedrosena.)

Third—That the defendant has no authority whatever to make objections for the people of the district.

Fourth—The respondent admits that a judgment against the land of the district and all of its inhabitants, without notice, would be void.

Fifth and sixth—The Board of Supervisors have exclusive power to establish and define the boundaries of a district, and to say what lands shall, and what shall not, be included within those boundaries. (Stats. 1837, p. 30, sec. 2; Central Irrigation District vs. De Lappe, 79 Cal. 351.) That what the Legislature had power to do by special act before the Constitution of 1879, it had delegated to local tribunals to do now. The question whether a town should be included in an irrigation district was one of public policy (Cooley on Const. Lim. 150); the legislative enactment that a district will be benefited is conclusive (Cooley on Const. Lim. 661, 2d ed.). That the legislative act of assigning districts for special taxation on the basis of benefits cannot be attacked on the ground of error in judgment regarding the special benefits (Cooley on Taxation, 450; Litchfield vs. Vernon; People vs. Lawrence, 41 Id. 140; St. Louis vs. Octers, 36 Mo. 456; Shaw vs. Dennis, 5 Gilm. 416; Philadelphia vs. Field, 58 Pa. St. 320; Wright vs. Boston, 9 Cush. 233.) The lands may not be susceptible of irrigation; the criterion is, are the benefited by it? (Stats. 1887, p. 29, sec. 2.) The determination of the board on this point is conclusive. The statute of 1887 leaves no doubt whatever that the Legislature contemplated the inclusion of city and town property in a district when, in the opinion of the Board of Supervisors, it would be benefited thereby. The policy of the law was a broad one, that whatever property would receive a benefit, whether by being developed, as agricultural lands or by having the conditions surrounding it so improved as to enhance its market value, should be properly assessable and might be included. (Turlock Irrigation District vs. Williams, 76 Cal. 360; Cooley on Taxation, pp. 450-451, 1st ed.; Downer vs. Boston, 61 Mass. 281; 32 Cal. 553; Wright vs. City of Boston, 63 Mass. 239.) That the evidence does not show that the Board of Supervisors did not exercise their best judgment in establishing the boundaries of the district. That parole evidence cannot be admitted to contradict the record. (School District vs. Atherton, 12 Mt. 113; Morrison vs. City of Lawrence, 11 Browne 221; Dillon on Mun. Corp., secs. 295, 299; Taylor vs. Henry, 2 Pick. 397; Mayhew vs. District of Gay Head, 13

Allen, 129; Boston Tp. Co. vs. Pomfret, 20 Conn. 500; Gilbert vs. New Haven, 40 Conn. 102; Langsdale vs. Bonton, 12 Ind. 467; Indianapolis vs. Imberry, 17 Ind. 175, 179; Delphi vs. Evans, 38 Ind. 90; Bigelow vs. Perth Amboy, 1 Dutch (N. J.) 296; Gearhart vs. Dixon, 1 Pa. St. 224; City of Lowell vs. Wheelock, 11 Cush. 331; Morrison, Admx., vs. City of Lawrence, 98 Mass. 221; Louisville vs. McKegney, 7 Bush. 651; 47 Cal. 483; Meeker vs. Van Rensselaer, 15 Wend. 397.) No fraud is charged by the appellant.

Seventh—The exclusion of lands was legal. No bonds had been sold. There was neither a delivery of bonds nor an offer of payment of the price. (Blackwood vs. Cutting Packing Company, 76 Cal. 212; Peabody vs. McGuire, 79 Me. 585; Evansville Railroad Company vs. Erwin, 14 Ind. 464; Turner vs. Moors, 53 Vt. 456; Adams vs. Connor, 100 Mass. 515.) But the appellant cannot raise any objection to the exclusion, because the statute was only intended for the benefit of the holder of outstanding bonds. (Stats. 1883, p. 21, secs. 4-6.)

Eighth—That the appellant cannot object to the exclusion on behalf of owners of land within the excluded district.

Ninth—That the determination to proceed upon any given plan of irrigation was not conclusive on the board, and it was their duty to change their plans as often as it became apparent that any other plan was better than the one under contemplation.

Tenth—The respondent contends that the notice stated the prayer of the petition sufficiently. (Lent vs. Tilson, 72 Cal. 404.)

Eleventh—That the amendment was only such as was necessary to meet the proofs, and that such an amendment was clearly admissible. (Connolly vs. Peck, 3 Cal. 82; Valencia vs. Cauch, 32 Cal. 340; Tryon vs. Sutton, 13 Cal. 494; Hooper vs. Wells, 27 Cal. 35; Carpenter vs. Brenham, 50 Cal. 549; Farmers' National Bank vs. Stover, 60 Cal. 387.)

Twelfth—It was not necessary that a notice of the bond election should have been posted in the office of the board of directors. The provisions of section 5 of the act of 1887 do not apply. The provisions of section 15 govern. (Endlich on Interpretation of Statutes, sec. 399.)

Thirteenth—The action for confirmation lies before the bonds have been delivered into the hands of a purchaser. Any other interpretation would defeat the purpose of the statute, as the essence of the whole act is that the purchaser may have the benefit of its provisions before he incurs any hazard in the purchase of the bonds.

Fourteenth and Fifteenth—The Legislature has power to bind a new district for bonds issued before the exclusion of lands. (Dillon on Mun. Corp., 3d ed., secs. 185, 186, 187, 189.) Funds raised or to be raised by taxation are subject to municipal control. (Creighton vs. San Francisco, 42 Cal. 446; Blanding vs. Burr, 13 Cal. 343; Town of Didon vs. Maves, 72 Cal.

C. A. Stonesifer (A. L. Rhodes of counsel) contended that notice to those interested in the litigation only was necessary; that the defendant cannot complain of want of notice of the amended petition, as he had appeared, and that he had no authority to object that other persons had no notice (McGray vs. Pedrorrena, 58 Cal. 94); that notice of amended pleadings need not be given to those not appearing (C. C. P., 1014); that this was not a proceeding in rem, but a special proceeding (Confirmation act, sec. 1); that notice by publication in a special proceeding was due process of law. (Lent vs. Tillson, 72 Cal. 404; Davidson vs. New Orleans, 96 U. S. 104; Riley vs. Lancaster, 39 Cal. 354; Eitel vs. Foote, 39 Cal. 440; Mayo vs. Foley, 40 Cal. 293; State vs. McGlynn, 30 Cal. 233; Irwin vs. Scriber, 18 Cal. 440; Boyd vs. Blankman, 39 Cal. 19; People vs. Hagar, 52 Cal. 171; Barrett vs. Carney, 33 Cal. 533; Friedlander vs. Loucks, 34 Cal. 38.)

Further, that the including of Modesto was not a violation of the law; that the question as to what lands should be benefited and should be included within a district is committed to the judgment and discretion of the board, and that its action is conclusive; that inquiry cannot be made into the motives of the members of the board; that nothing short of actual fraud will be a ground of attack, and that the acts of fraud must be specifically alleged. (People vs. Hagar, 52 Cal. 181; Freeman on Judgments, secs. 523, 524; Bigelow on Estoppel, p. 142; People vs. Hagar, 66 Cal. 60; Bernal vs. Lynch, 36 Cal. 135; Waugh vs. Chauncey, 13 Cal. 11; Comstock vs. Crawford, 3 Wall. 403; Mayo vs. Ab. Loy, 32 Cal. 479; People vs. Doe, G., 36 Cal. 220; Mayo vs. Foley, 40 Cal. 283; United States vs. Arredondo, 6 Peters 729.)

That the exclusion of a body of land from the district did not affect the proceedings. The proceedings were regular. (Stats. 1889, p. 21). There were no outstanding bonds, as bonds contracted to be sold but not delivered are not outstanding bonds. There was no objection to the exclusion, and therefore no election was required. And if the exclusion was irregular, the defendant would have no cause of complaint, as the land would still be in the district; that there was nothing in the evidence to sustain the claim that the \$400,000 of bonds ordered to be sold was not part of the \$800,000; that the source and mode of obtaining water may be changed from time to time. The notice sufficiently states the prayer of the petition (McGray vs. Pedrorrena, 58 Cal. 94), and conforms to section 3 of the Confirmation act. A trial de novo was not required upon the filing of the amended petition; the posting of the general notice required by section 5 was established by presumption (C. C. P., sec. 1963, sub. 15; 1 Phil. on Ev., Cow., Hill & E. notes, p. 604; People vs. Holden, 28 Cal. 133); that if there was an omission to do so it did not affect any substantial rights, and must be disregarded (Pol. Cod., sec. 4; 10 La. 218); further, that section 5 does not govern, but that the notice is regulated by section 15 of the act, and that on the pleadings the point cannot be made or maintained.

The statute does not bear out the construction contended for, that the action was prematurely brought. The denomination of the bonds need not be fixed at one and the same time, as that matter is left with the discretion of the board. The contention that the authorization became void because part of the district was excluded cannot be sustained. The proceedings in the formation, organization and government of irrigation districts are to be liberally construed. (Irrigation District vs. De Lappe, 79 Cal. 354; Irrigation District vs. Williams, 76 Cal. 368.)

George W. Schell, C. W. Eastin and Thomas B. Bond, for the appellants, in reply contended:

The judgment of the board is not conclusive. It is not only essential that the land should be benefited by irrigation, but also that it must be from a common source and the same system of works. The city of Modesto cannot be benefited from a common source by the same system of works. Evidence of this fact, and of

the fact that the board were aware of it, was rejected. The board is not the final judge as to whether the land is susceptible of irrigation. There should have been notice of the amended complaint. (Thompson vs. Johnson, 60 Cal. 294.) Tregea has the right to make the objection, as neither the judgment nor the action are against him, but against the district, and he has the right to appear and show cause why the judgment should not be taken against all the people. The bonds must be immediately issued, and must be numbered as issued, and bear date at the time of their issue. The sale of the bonds to Perley & Tucker was complete, and the title passed; the board had no power to rescind the sale, and the exclusion of the 23,000-acre tract was void, because they never assented to it. Respondent is estopped to deny that the land was included. (C. C. P., sec. 1962, sub. 3.) If the land was properly included, it would violate Art. XI, secs. 12 and 13 of the Constitution, to impose upon the new district the burden of the old. The new district never assented to the issuance of the bonds, except in conjunction with the old. The exclusion of 23,000 acres of land and the adoption of a totally different scheme without the concurrence or assent of the people remaining in the district was a violation of their constitutional rights. The advertisement of the bonds of the district for sale, the unconditional bid of Perley & Tucker, and the unconditional acceptance of the bid by the board, and the order entered by them upon their records selling the same to Perley & Tucker, constituted a complete sale, which either party could enforce in law—one which could not be set aside or annulled by the private or secret agreement of one or both. This sale was in force when the order of exclusion was made and was made without their assent. The denial of notice in the answer, though made on information and belief, puts in issue the giving of notice. (Reid vs. Buflum, 79 Cal. 82.) The giving of the notice required by section 5 was essential. (People vs. Seale, 52 Cal. 620; People vs. Castro, 39 Cal. 65.) The defendant did not have to prove his negative allegation that no notice was given. (C. C. P., sections 1868, 1961; Stevens' Evidence, 96; Greenl. Evidence, 70, ch. 7; U. S. vs. So. Cal. Coal Co., 1 W. C. R. 1-12; Bates vs. Lyman, 12 Pac. 33.) The election for bonds was a special election. Notice of the time and place was necessary, therefore the notice prescribed by section 5 was necessary. The allegations in the complaint are sufficiently traversed. (Hill vs. Smith, 27 Cal. 480; Estee's Pl., 3d ed., par. 3174.) Time and place are the substance of every election. (Dickey vs. Hulbert, 5 Cal. 345; Leading Election Cases, 254; Chadwick vs. Melvin, Sup. Ct., Pa., March term, 1871.) Section 5 applies to every election held under the Wright act. The case of Lent vs. Tillson, 72 Cal. 424, does not sustain the proposition that no election was necessary. The action of the board in abandoning one scheme and adopting another vitiated the proceedings for the issuance of the \$400,000 bonds was not based on the estimates of the board prior to the election called for the first scheme, but on the new estimate made on the new scheme, eleven months after the election. The board having made this estimate eighteen months after the election, their action is invalid unless ratified by an election. An order of a Board of Supervisors does not impart the same absolute verity as a judgment. (C. C. P., sec. 1962.)

By the court, Beatty, C. J.: This is a special proceeding instituted in pursuance of the act of March 16, 1889 (Stats. 1889, p. 212), for the purpose of obtaining judicial confirmation of the validity of certain bonds of the respondent which it has ordered to be issued and sold.

The act referred to is supplemental to the act entitled "An act to provide for the organization and government of irrigation districts and to provide for the acquisition of water and other property and for the distribution of water thereby for irrigation purposes," approved March 7, 1867, and commonly known as the Wright law. (Stats. 1888, p. 29.)

The original act, as its title imports, provides

for the organization of the irrigation districts, and for the adoption and carrying out of plans for the irrigation of the lands embraced therein. Among other things provided is the issuance and sale of the bonds for the several districts. Before any such bonds can be issued or sold the directors of the district are required to submit the proposition to a vote of the electors at a special election and to order and give notice of such election in a manner particularly prescribed.

As to the validity of the bonds when issued, depends upon the regularity of the proceedings of the board and upon the ratification of the proposition by a majority of the electors. It is a matter of common knowledge that investors have been unwilling to take them at their par value while all the facts affecting their validity remain the subject of question and dispute.

To meet this inconvenience—for the security of investors, and to enable the irrigation districts to dispose of their bonds on advantageous terms—the supplemental act, under which this proceeding was instituted, was passed.

It provides that the board of directors of any irrigation district "may commence a special proceeding, in and by which the proceedings of said board and of said district providing for and authorizing the issue and sale of the bonds of said district, whether said bonds or any of them have or have not been sold, may be judicially examined, approved and confirmed."

The proceeding is commenced by the filing of a petition in the Superior Court of the county in which the lands of the district, or some portion thereof, are situate, praying the confirmation of the proceedings of the directors. Whereupon, the court is required to make and publish an order stating the prayer of the petition and fixing a time and place for the hearing.

Any person interested may demur to or answer the allegations of the petition, and the issues of law and fact are tried and determined by the court as in other cases under the ordinary rules of practice.

The court has power, upon the hearing, to examine and determine the legality and validity of the organization of the district, and all matters affecting the legality and validity of the bonds and the order for their sale, and has the power to confirm the proceedings in whole or in part, according to the facts.

In this case, the proceeding of the Superior Court resulted in a judgment affirming the regularity of the organization of the respondent as an irrigation district, and the legality and validity of its orders for the issuance of its bonds to the amount of \$800,000, and for the sale of \$400,000 thereof.

The defendant, a resident and property-owner of the district, who contested the validity of the respondent's proceedings, appeals from the judgment of the Superior Court and from an order denying his motion for a new trial.

Numerous errors are assigned and argued, but they are all involved in, and may be disposed of by, a consideration of a few general propositions:

First—It is contended that there was not sufficient notice of this proceeding to give the Superior Court jurisdiction to render a judgment binding upon the lands of the district and their owners. There seems to be a claim under this head, though it is not particularly insisted upon, that the notice prescribed by the statute is not sufficient.

The object of the proceeding is, of course, to compel every person interested in the district, and whose property is to be bound for the payment of its debts, to come into court, and within the time limited, present and submit to judicial investigation any and all objections he may have to the regularity of the organization of the district, and all other matters affecting the validity of the bonds, so that it may be finally and conclusively determined by a judgment which neither he nor his successors

in interest can thereafter question, whether such bonds are legal and valid or not.

Notice must therefore be given to all persons so interested. But it need not be a personal notice. It not only may be, but to secure the ends of the statute it must be, a general notice by publication in some form. It is unnecessary to take up time in the discussion of this question, which has long since ceased to be an open one in this State. Without referring to many earlier and later decisions bearing more or less directly upon the point, it is sufficient to say that the statute and proceedings under review in *Lent vs. Tillson*, 72 Cal. 404, were in all essential respects similar, as to their objects and the substance of their provisions, to the statutes and proceedings in question here, and the notice of this proceeding prescribed by the statute of 1889 is for every purpose as ample and beneficial as the notice to property-owners, which was in that case held sufficient to give validity to the proceedings by which the lands of the local assessment district were subjected to a lien for the payment of the Dupont-street bonds. The provisions of the supplemental act in regard to this matter are found in section 3, Statutes of 1889, page 212, which reads as follows:

"The court shall fix the time for the hearing of said petition, and shall order the clerk of the court to give and publish a notice of the filing of said petition. The notice shall be given and published in the same manner and for the length of time that the notice of a special election provided for by said act to determine whether the bonds of said district shall be issued is required to be given and published. The notice shall state the time and place fixed for the hearing of the petition, and the prayer of the petition, and that any person interested in the organization of said district, or in the proceedings for the issue or sale of said bonds, may, on or before the day fixed for the hearing of said petition, demur to or answer said petition. The petition may be recited to and described in said notice as the petition of the Board of Directors of — Irrigation District (giving its name), praying that the proceedings for the issue and sale of the bonds of said district may be examined, approved and confirmed by said court."

But it is further contended that even conceding the sufficiency of the notice prescribed by the statute, the notice actually given of this proceeding did not comply with the statute.

In order to arrive at a proper understanding of the several objections falling under this head, it is necessary to state generally the facts concerning the organization of the respondent as an irrigation district and its subsequent proceedings.

The petition of the Supervisors of Stanislaus county, in which all its lands are situate, for the formation of the district, was filed May 11, 1887, and the order of the board declaring the due organization of the district was made July 18, 1887. Thereupon the directors of the district organized, caused surveys and estimates of the cost of acquisition and distribution of water to be made, and on November 19, 1887, fixed the sum necessary to be raised by the issuance of the bonds of the district at \$800,000. The proposition to issue this amount of bonds was at a special election submitted to a vote of the electors of the district, who by a considerable majority voted in favor of the proposition.

Upon ascertaining the result of this election the directors, on the 3d day of January, 1888, "resolved and ordered that the bonds of said district in the sum of \$800,000 be issued in the manner and form prescribed by said act."

After resolving upon the issuance of said bonds, several unsuccessful efforts seem to have been made to dispose of a portion of the amount authorized, and finally on July 31, 1889, the following resolutions were adopted by the board of directors:

It is hereby ordered that the bonds of this district be issued in the amount of \$400,000 of the

wing denominations: Seven hundred and fifty bonds of the denomination of \$500 each, and bonds of the denomination of \$100 each, and that the said bonds shall in form and substance conform to the provisions of the act of the Legislature of the State of California, entitled "An act to provide for the organization and government of irrigation districts, and to provide for the acquisition of water and other property and for the distribution of water thereby for irrigation purposes," approved March 7, 1887, and that they be signed, sealed and numbered as in said act provided.

It is further ordered that the bonds of the district conforming to the provisions of said act and to this order be prepared, executed and issued in such manner and form in all respects that they shall become and be ready for sale by this board and on behalf of this district.

Resolved, That this board hereby declares its intention to sell the bonds of this district to the amount of \$400,000, to wit: Seven hundred and sixty bonds of the denomination of \$500 each, and 200 bonds of the denomination of \$100 each; and it is therefore ordered that a notice that sealed proposals will be received by this board at its office, in the city of Modesto up to the hour of 1:30 p. m. of the 31 day of September, 1889, for the purchase of said bonds be published for twenty days before the said date in the following newspapers: The *Daily Alta*, published in the city of San Francisco; the *Record-Union*, published in the city of Sacramento, and the *Daily Times*, published in the city of Los Angeles. On motion duly made, seconded and carried, it was ordered that the board of directors of this district commence special proceedings in and by which the proceedings of said board and of said district for and authorizing the sale of the bonds of said district may be judicially examined, approved and confirmed.

In pursuance of this resolution, the original petition in this case was filed in the Superior Court of Stanislaus county on the following day, August 1, 1889.

In this petition the due organization of the district, under the act of March 7, 1887, is alleged to have been effected on the 18th day of July, 1887. It is alleged that certain persons (naming them) were then duly elected, and have ever since been the directors of the district; that all its lands are in Stanislaus county; that as soon as practicable after its organization, to wit: on November 19, 1887, the directors duly estimated the cost of acquiring water rights and constructing irrigation works for the district at \$800,000, and that it was necessary to issue the bonds of the district to that amount, and that the same should be sold, provided the electors of the district should vote in favor of their issuance. It is alleged that a special election was immediately called, at which the proposition should be submitted and voted upon, of which the notices required by the statute were duly published and posted: that at the time appointed the election was in fact held; that the returns of said election were duly made and canvassed, and the result duly declared and recorded, and that the vote was 439 in favor of, and only seventy-six against the proposition. The original petition fails at this point to state the next steps actually taken by the board of directors, viz.: Its resolution of January 3, 1888, to issue the \$800,000, authorized by said vote, and its unsuccessful efforts to sell portions of such issue. Omitting all reference to these proceedings, it alleges the orders and resolutions of July 31, 1889, above quoted, directing the issuance and sale of bonds to the amount of \$400,000, and closes with the following prayer:

Wherefore, your petitioner prays that the proceedings aforesaid, for the issue and sale of said bonds of said irrigation district, may be judicially examined, approved and affirmed by said court.

Upon the filing of this petition the Judge of the Superior Court made an order fixing the 24th day of August, 1889, for the hearing of the petition, and ordered the clerk to cause notice of the filing of the petition to be given and published, as prescribed by law.

In pursuance of said order, the following notice was issued and published for the prescribed period:

In the Superior Court of the county of Stanislaus, State of California. In the matter of the Modesto Irrigation district, No. 1003.

Notice is hereby given that the petition of the board of directors of the Modesto Irrigation district, praying that the proceedings for the issue and sale of the bonds of said district may be examined, approved and confirmed, was on the 1st

day of August, 1889, filed in said court; that said court fixed as the time for the hearing of the said petition the 24th day of August, 1889, at the Court-house in the city of Modesto; and notice is further given that any person interested in the organization of said district, or in the proceedings for the issue or sale of said bonds, may, on or before the day last above mentioned, demur or answer said petition.

By order of the court.

Attest: E. D. McCabe, clerk.

By A. J. Lewis, deputy clerk.

(Indorsed.) Filed October 21, 1889.

E. D. McCABE.

The defendant, on the 24th day of August, 1889, appeared in the proceedings by his attorney and filed a demurrer to the petition, which was overruled by the court, and on September 3d he filed an answer, and the issues were set for trial on October 21, 1889, upon which day the trial commenced and continued until both parties closed their evidence on October 26th, whereupon the court adjourned until October 28th. When the hearing was resumed on the 28th, and after the argument had commenced, the petitioner asked and obtained leave to file and serve an amended petition, and defendant was granted leave to demur to or answer such amended petition within ten days after service of an engrossed copy.

On the 30th day of October the amended petition was filed, which, in addition to the allegations of the original petition, alleged the order of the board of directors of January 3, 1888, for the issuance of the \$800,000 of bonds voted by the electors, and also that the \$400,000 of bonds ordered issued and sold by the resolution of July 31, 1889, were a part of the amount of \$800,000 ordered issued by the resolution of January 3, 1888. The prayer of the amended petition was a repetition of the original prayer.

The defendant, upon being served with the amended petition, again demurred, and his demurrer being overruled, he again answered specifically, denying everything alleged in the petition, and setting up several matters of defense. He then demanded that the whole case should be tried de novo, disregarding all the evidence that had been taken. But the court refused this demand, holding that the evidence already taken might properly be considered, but allowing the parties to introduce evidence as to the new matters embraced in the amended pleadings.

In pursuance of this order the trial was resumed on November 21st between the petitioner and defendant, and thereupon the case was argued, submitted and decided.

No notice of the changes introduced into the petition by the amendments above mentioned was ever published or served in any manner except upon the defendant, but the court in its findings and decree confirmed and declared valid not only the order of July 31, 1889, relating to the issue and sale of the \$400,000 of bonds, but also the order of January 3, 1888, relating to the issue of \$800,000, which, as we have said, was mentioned for the first time in the amended petition.

Such being the case, the appellant objects to the published notice of the filing of the petition; first, that it was insufficient as a notice of the original petition; and second, that it could not possibly confer upon the Superior Court any jurisdiction to confirm the proceedings alleged for the first time in the amended petition.

The statute (sec. 3) requires that the notice shall state, among other things, the prayer of the petition, and it is contended that this notice did not state the prayer of the petition.

But we think the notice contained everything necessary to a substantial compliance with the law.

The prayer of the petition must be read in connection with the petition itself in order to understand its meaning, but so read it is clear and intelligible, and is in effect a prayer for the judicial examination, approval and confirmation of all the proceedings set out in the petition, including those for the organization of the district, for they, like the rest, were essential to the legality and validity of the bonds, and accordingly the statute (sec. 5) expressly confers power and jurisdiction upon

the court, in all proceedings for the confirmation of bonds, to examine and determine, approve and confirm the proceedings for the organization of the district, as well as all other proceedings that may affect the legality and validity of the bonds and the order for their sale.

The prayer, therefore, was sufficient when read in connection with the petition, but to have repeated it in its literal terms in the notice would have been meaningless, and the only way to "state" it was to give its substance, as was done.

Of course, to a person entirely ignorant of the law authorizing and regulating the proceedings, the notice may have been unintelligible, but it would have been equally so to such a person if the prayer of the petition had been as full and specific as the allegations upon which it was founded, and had been copied verbatim in the notice.

A knowledge of the law is, however, imputed to every one interested in the proceeding, and it is decided, in *Lent vs. Tillson*, supra, that the notices required in cases of this character are to be construed and aided by reference to the statute.

So read and construed, we think that the notice in this case was in substantial compliance with the statute, and imparted sufficient notice to all the world that the directors of Modesto irrigation district No 1003 would, on the 24th day of August, 1889, submit the question of its corporate existence and the regularity of all its proceedings for the issuance and sale of its bonds, so far as the same were set out in its petition on file, to the Superior Court of Stanislaus county, and would ask the court to decree the regularity of all such proceedings; and we think that all persons interested in the district, being so notified of the time of the filing of the petition, and of the office in which it remained as a public record, were bound to take notice of its specific allegations, and if they had any objection to the confirmation of the orders and proceedings referred to in the prayer of the petition, that they were required to present their objections to the court at the time and place mentioned in the notice, or be forever precluded—they and their successors—from questioning the validity of the bonds issued in pursuance of such proceedings.

But could the court, without the publication of a new notice for the statutory period, acquire jurisdiction to examine and make a valid confirmation of proceedings not set out in the petition on file when the original notice was published, and to which it alone referred? Or, to state the question more precisely, could

the court, by giving notice of a petition to confirm an order for the issue and sale of bonds to the amount of \$400,000, acquire jurisdiction to confirm an order for the issuance of bonds to the amount of \$800,000? We do not think it could.

The only answer which respondent makes upon this point to the contention of appellant, is that he had notice of the amended complaint, that he demurred and answered to its allegations, and therefore cannot be heard to object that other persons had no notice.

Of course, in ordinary proceedings intended to fasten a liability upon particular defendants, and in which each may be made independently liable, this would be a sufficient answer. But here the proceeding is in rem, and its object is to establish the validity of the bonds as against the irrigation district and all persons interested in the district. To be effective for the protection of investors or of advantage to the district, the judgment should bind all the world. A judgment binding upon the appellant alone must be in effect a nullity, leaving the district in precisely the same position it was in before the proceeding was commenced.

Such being the case, this appellant, as landowner of the district, directly interested in the price to be realized upon a sale of its bonds, has a right to insist that the steps necessary to give the court jurisdiction to pronounce a binding decree shall be regularly taken.

And we can see no escape from the conclu-

sion that this decree, so far as it attempts to confirm the order of January 3, 1888, for the issuance of \$800,000 of the bonds of the district, is erroneous and void for want of jurisdiction. But we think there is no doubt that the Superior Court had jurisdiction, acquired by full compliance of the law, to examine into and confirm the order of July 31, 1889, for the issuance and sale of \$400,000 of the bonds of the district, and that as to that order the decree may be affirmed if it, and the proceedings upon which it was founded, were regular and legal.

To sum up this branch of the case, we are told, with reference to the points presented by appellant, as follows:

The object of the act of March 16, 1889, is to provide a security for investors and promote the advantage of the irrigation districts by enabling the courts of the State to render a judgment binding on all the world as to the validity of bonds to be offered for sale by such districts.

To obtain such judgment the petition should set forth the particular orders for the issuance and sale of bonds, confirmation of which is desired. How fully the preliminary proceedings must be alleged is a question which does not arise here; but with respect to the organization of the district, it is only necessary that its due organization, and the election of its first board of directors, should be alleged in general terms. The prayer of the petition is sufficient if it prays for the examination, approval and confirmation of the proceedings "aforesaid" for the issuance and sale of bonds of the district, and the notice is sufficient if it states the substance of such prayer and in other respects conforms to the statute. But the decree of the court cannot go beyond the orders for the issuance and sale of bonds which are alleged in the petition, and, in case the original petition is amended by setting out other orders for the issuance or sale of bonds, the court will not acquire jurisdiction to confirm such orders without the publication of a new notice of the amended petition.

A decree, however, confirming all the orders alleged in the original and amended petitions

is not void for want of jurisdiction as to the orders set out in the original petition, merely because no new notice has been given of the filing of the amended petition. If there was due publication of sufficient notice of the original petition, the decree of the court confirming the orders for the issuance and sale of bonds therein specifically alleged, and of all the preliminary proceedings affecting their validity, including those for the organization of the district and the election of its first board of directors, is within the jurisdiction of the court and can be assailed only by those who have contested the proceeding, and by them only upon the ground of prejudicial errors affecting their substantial rights which have been duly excepted to.

In this case, accordingly, we hold that so much of the decree as confirms the order for the issuance of \$800,000 of bonds of the district, dated January 3, 1888, is void, but that it should be affirmed so far as it confirms the order of July 31, 1889, for the issuance and sale of \$400,000 of the bonds of the district, unless in conducting the proceeding the Superior Court committed error to the prejudice of this appellant.

The first point urged by the appellant upon this branch of the case is that the Superior Court had erred in confirming the proceedings of the Board of Supervisors in organizing the district, because said board by including therein the city of Modesto had violated the following provision of the Wright law: "Nor shall any lands which will not in the judgment of said board be benefited by irrigation by said system be included within such district." (Stats. 1887, p. 30, sec. 2.)

It appears from the record that the district is originally organized contained about 103,000 acres of land, including the city of Modesto, a town covering about 2000 acres and having about 3000 inhabitants and about 600 dwelling-houses, besides, shops, stores, etc.

One proposition of the appellant seems to be

that the mere fact of the corporate existence of a town or city, though situate in the midst of a district susceptible of irrigation by one system, necessarily deprives the Board of Supervisors of the county of the power to include any of the lands within the corporate limits of such city or town in an irrigation district. We say this seems to be a proposition of the appellant, because, although it is not expressly stated in terms, it appears to be necessary to sustain his contention; for if it lies within the discretion of the board to include in an irrigation district any part of the lands of a town or city upon the ground that in their judgment such part will be benefited by irrigation under the system proposed, and if the judgment of the board upon the question of benefits is conclusive of the fact—as we shall show that it is—there is no ground upon which a court can say that an order including all the lands of a city or town in such district is void.

The idea of a city or town is of course associated with the existence of streets, to a greater or less extent lined with shops and stores, as well as of dwelling-houses, but it is also a notorious fact that in many of the towns and cities of California there are gardens and orchards inside the corporate boundaries requiring irrigation. It is equally notorious that in many districts lying outside of the corporate limits of any city or town there are not only roads and highways, but dwelling-houses, outhouses, warehouses and shops. With respect to these things which determine the usefulness of irrigation there is only a difference of degree between town and county. The advantages of irrigation to a town like Riverside, in San Bernardino county, for instance, no one could deny, and the difference between such a town and those places where irrigation would be as manifestly out of place are not marked by any hard and fast line which would enable a court to lay down a rule of discrimination. The question whether in any particular case a town will, as a whole, be benefited directly by the application of water for irrigation is in its nature, and under existing conditions must remain, a question of fact to be decided by that tribunal to whose discretion it had been committed by the Legislature. It is very certain that the Legislature intended that cities and towns should in proper cases be included in irrigation districts, for the act expressly provides for the assessment and taxation, according to their value, not only of city and town lots, but also of the improvements thereon. (Stats. 1887, p. 37, secs. 13 et seq.) And this section of the law was made an argument against its constitutionality in the case of Turlock Irrigation District vs. Williams, in which its constitutionality was affirmed. (76 Cal. 360.) Such having been the intention of the Legislature, as is clearly apparent, and it being equally clear and notorious as matter of fact that there are cities and towns which not only may be benefited by irrigation, but actually have in profitable use extensive systems for irrigating land within their corporate limits, it cannot be denied that the Supervisors of Stanislaus county had the power to determine that the lands comprising the city of Modesto would be benefited by irrigation, and might be included in an irrigation district.

There was, it appears, a large majority of the electors of Modesto in favor of such inclusion. But the appellant and others owning buildings objected to being included in the district, on the ground that their lots covered with stores, shops and warehouses would not be benefited. If this objection was good ground for excluding the city from the district it is probable that no district could ever be successfully organized, for, in the nature of things, an irrigation district must cover an extensive tract of land, and no matter how purely rural and agricultural the community may be there must exist here and there within its limits a shop or warehouse covering a limited extent of ground that can derive no direct benefit from the use of

water for irrigation. Here, again, the difference between town and county is one of degree only, and a decision in the interest of the owners in towns, that their lots cannot be included in an irrigation district, would necessarily cover the case of the owner of similar property outside of a town.

It is nowhere contended by the appellant that in organizing irrigation districts it is the duty of the Supervisors to exclude, by demarcation, every minute tract or parcel of land that happens to be covered by a building or other structure which unfits it for cultivation, and certainly the law could not be so construed without disregarding many of its express provisions, and at the same time rendering it practically inoperative.

We construe the law to mean that the board may include in the boundaries of the district all lands which, in their natural state, would be benefited by irrigation and are susceptible of irrigation by one system, regardless of the fact that buildings or other structures may have been erected here and there upon small lots, which are thereby rendered unfit for cultivation, at the same time that their value for other purposes may have been greatly enhanced.

So construed, we can see no objection to the law upon Constitutional grounds or grounds of expediency.

As to the owners of such property, it seems reasonable to assume that they must participate, indirectly at least, in any benefits the district may derive from the successful inauguration of a system of irrigation; but aside from this, the law contains an express provision designed to secure to them a benefit exactly corresponding to any burden to which they may be subjected, and in that respect is far more equitable than many of the assessment laws which have been upheld here and elsewhere. The provision referred to is this: Every taxpayer of the district receives a portion of all the water distributed exactly equivalent to his proportion of the total tax levied, and this water is his to use or to sell, as he may elect, so that if his lot is not fit for cultivation, he, nevertheless, gets a full equivalent for the tax assessed to him. (Stats. 1887, p. 34, Sec. 11.)

Upon these grounds we hold that a city or town, or a portion thereof, may, in a proper case, be included in an irrigation district.

As to what is or what is not a proper case for such inclusion, the decision of that question has been committed to the several Boards of Supervisors, whose discretion is not subject to the control of any court. Upon matters affecting their jurisdiction the orders of the Board of Supervisors may be open to review, but upon the question of fact as to what lands will or will not be benefited by irrigation their decision is final and conclusive. (See section 2 of the act, Statutes of 1887, p. 30.)

The formation of irrigation districts is accomplished by proceedings so closely analogous to those prescribed for the formation of swamp land reclamation districts that the decisions with respect to the latter are authority as to the former, and we cite as conclusive of this point *People vs. Hagar*, 52 Cal. 181; *id.*, 66 Cal. 60. Many other decisions to the same effect are cited in the briefs of counsel, but we deem it unnecessary to refer to them here.

The Superior Court did not err, therefore, in refusing to allow the appellant to introduce evidence for the purpose of proving that his and other lots in the city of Modesto would be benefited by the proposed system or any system of irrigation. Nor did the court err in refusing the offer of appellant to prove that the Board of Supervisors wrongfully included the city of Modesto in the irrigation district, for

the purpose of carrying out the scheme of organization, against the wishes of the farmers outside the city.

To entitle the appellant to prove that the board and its members, well knowing that the lands of the city would not be benefited by irrigation, had, nevertheless, included them for the corrupt purpose suggested, and not in the exercise of their honest judgment and discretion, the facts constituting the fraud should have been fully pleaded in the answer, but no such facts as he offered to prove were pleaded.

It is, indeed, alleged that the order including the city was not made in the exercise of the judgment and discretion of the board, but contrary thereto. This allegation is part of a separate defense, in which it is coupled with other allegations, going to show that the lands of the city would not be benefited by irrigation, but it is nowhere alleged that the board,

or any of its members, actually believed at the time they offered such lands to be included in the district, that they would not be benefited. The court, therefore, properly sustained the objection that the offered evidence was immaterial.

As to all such matters as were alleged in the answer, the evidence shows that the Board of Supervisors acted with the utmost deliberation upon the petition for the organization of the district; that they heard and considered numerous objections, and the testimony offered in support of them, and did not make their final decision until the time allowed for deciding had nearly elapsed.

The next point urged for appellant arises out of the fact that after the original organization of the district including 108,000 acres, and after the proposition to issue \$800,000 of bonds had been ratified by a vote of the electors of the district and after the resolution of the directors to issue the bonds to that amount, the Board of Supervisors had ordered a portion of the district embracing 28,000 acres to be cut off and excluded therefrom.

It is contended that this order—which was one of the proceedings confirmed by the Superior Court—was void for want of jurisdiction in the board to make it.

The proceedings for the exclusion of lands from an irrigation district of which they form a part are authorized and prescribed by another act amendatory and supplemental to the Wright act, approved February 16, 1889. (Stats. 1889, p. 21.)

This act provides for the filing of a petition for exclusion by owners of lands within the district, notice of the filing of such petition, and time and place of hearing, the presentation of objections by parties interested, and in certain cases for a submission of the question of exclusion to a vote of the electors of the district.

Among other things it is provided that if there be any outstanding bonds of the district no order of exclusion can be made without the consent in writing of the holders of such bonds, acknowledged as deeds of conveyance are required to be acknowledged.

It is contended by the appellant that at the time the petition for the exclusion of the 28,000 acres was filed, and during the greater portion of the time the notice of the hearing was being published, there were outstanding bonds of the district, and that no written consent of the holders of said bonds was ever given to the making of the order.

But the fact is there never were any outstanding bonds of the district. Its bonds, as above stated, had more than once been offered for sale, and at one time a bid for \$50,000 of the bonds had been made by Tucker & Perley and formally accepted by the directors.

But the evidence shows that at the time of the making and accepting of this bid there was an understanding between the bidders and the directors that the former were not to be held to their offer unless they could succeed in negotiating a sale of the bonds to some outside party, and as they failed to do so the bonds had never been issued or paid for. And prior to the making of the order of exclusion Tucker & Perley had, upon their written request, been released from their offer by formal resolution of the board of directors.

Such being the case, it is clear that there had not only never been any outstanding bonds of the district, but that at the date of the order of exclusion there was not even a subsisting contract for the issuance of the bonds.

We cannot perceive, therefore, that the court committed any error in decreeing the validity of the order of exclusion. But, even if the decree had been in that respect erroneous, it is by no means clear that it would have been material. For the order of exclusion is not one of the orders set out in the petition of the respondent, confirmation of which is prayed. It is alleged, for the first time, in the answer of appellant, and its invalidity charged as matter of defense and as a ground for refusing confirmation of the order for the issuance and sale of bonds. It is, therefore, material only so far as its validity and invalidity affects such order for the issuance and

sale of bonds, and we do not understand how that order would be any more or less valid, whether the order of exclusion was legal or not.

The Superior Court did not err in holding that the \$400,000 of bonds ordered to be issued and sold by the order of July 31, 1889, was part of the issue of \$800,000 proposed and voted and ordered issued January 3, 1888. The evidence fully sustains the finding, and there is nothing really opposed to it except the mere fact that the resolution of the board of directors does not in express terms couple the issue and sale of the \$400,000 of bonds with the previous proceedings authorizing the issuance of \$800,000 of bonds. The fact that when the proposition for the issuance of \$800,000 was ratified by a vote of the electors the plan in contemplation was to bring water from the Stanislaus river sufficient to irrigate

one hundred and eight thousand acres, and that the order for the issuance and sale of \$400,000 was made after a change in the district and a change of plan contemplating the bringing of the water from the Tuolumne river sufficient only for the irrigation of eighty thousand acres, does not destroy the relation between the last order for the sale of bonds and the original authority to issue them. The authority to issue bonds is wholly independent of the source of supply of water or any plans for obtaining it. There is nothing in the law to prevent the directors from changing their plans in this respect whenever they find it to the advantage of the district to do so. And any order they may make for the issuance and sale of bonds must be referred to the proceedings by which alone such order is authorized, whether they are expressly referred to or not.

The Superior Court did not err in refusing to try the case de novo after the filing of the amended petition. All the evidence that had been taken was applicable to the issues formed by the amended pleadings, and, indeed, the principal object and only effect of the amendments to the petition was to make it conform to the evidence already in. It would, therefore, have been a mere waste of time, as well as a most unusual practice, to have introduced anew the evidence already before the court.

It is contended that the board of directors never had any authority to issue any bonds of the district, because no legal notice was given of the special election at which the proposition to issue bonds was submitted to a vote of the electors.

The point of this objection is that the general notice prescribed by section 5 of the Wright act (Stats. 1887, p. 31) was not posted in the office of the board. But this was a special election held under section 15 of the act, page 35, and the notices prescribed by that section were duly given. As we construe the law, that section applies to such special elections, to the exclusion of section 5.

It is contended that this judgment cannot be sustained, because the proceeding was commenced before any bonds had been issued. According to appellant's construction of the supplemental act, no proceeding can be commenced under it until bonds have been actually issued. There may be something in the literal terms of the title, and one or two clauses of the act, to countenance this construction, but, read as a whole, and with reference to its manifest purpose and the evil it was intended to correct, it must be construed as allowing the proceeding to be commenced as soon as any resolution has been adopted for the issue and sale of bonds.

Finally, it is contended by appellant that the authority originally granted to the directors to issue bonds to the amount of \$800,000 at the time when the district embraced 108,000 acres ended with the order excluding 28,000 acres; for, he says, even if the Legislature intended to bind the new or reconstituted district by a vote of the old district the law to that extent would be unconstitutional. (Citing sections 11, 12 and 13 of Article XI of the Constitution of California, and section 10, Article I, of the Constitution of the United States.)

If, after this district had actually incurred a debt by the issuance of bonds, a portion of the

lands of the district had been excluded without the consent of the owners of the lands remaining, the argument of appellant on this point would have had much force, and would at least have been deserving of serious consideration. But the fact being that at the time of the exclusion of 28,000 acres from this district it had no debt, and that after notice of the proceeding no objection was made to such exclusion by any person, there is no basis for any claim of injustice or violation of constitutional rights. The identity of the district was not destroyed by the exclusion of a part of its lands. Those who remain in the district will receive all the benefits of the expenditures of the proceeds of its bonds; they will not be compelled to pay for anything for the benefit of others. Nor is there anything in the law to compel the directors of the district, as constituted, to expend the whole amount of bonds authorized, if such amount shall not be needed. The provision of section 15 for the issuance of the bonds voted is merely directory, leaving it in the discretion of the board to issue and sell such amount of bonds, within the amount voted, and at such times, as they may find expedient.

Upon a review of the whole case, we conclude that all the proceedings examined, approved and confirmed by the Superior Court were regular and valid, but that the court did not acquire jurisdiction to confirm the order or resolution of January 3, 1888, for the issuance of \$800,000 of the bonds of the district in this proceeding. The order, however, is not essential to the validity of the order for the issuance and sale of \$400,000 of bonds, which depends upon and is sustained by the other proceedings for the organization of the district, and the issuance of bonds.

It is therefore ordered that the judgment and decree of the Superior Court be and the same is hereby modified by striking out so much thereof as confirms said order of January 3, 1888, for the issuance of \$800,000 of bonds of respondent, and as so modified the judgment and decree, as well as the order overruling appellant's motion for a new trial, are affirmed.

McFarland, J., Paterson, J., and Sharpstein, J., concurred.

HIGH INDORSEMENT.

WHAT C. P. HUNTINGTON THINKS OF IRRIGATION.

Able Papers by Messrs. Rhodes, Newlands, Wright and Jarboe.

In response to requests from the CHRONICLE the following papers upon the subject of irrigation and irrigation bonds have been prepared by the gentlemen whose names are signed thereto. None stand higher in the business and professional world than Messrs. Huntington, Rhodes, Newlands, Jarboe and Wright, and their judgment upon the matters referred to will be accepted as conclusive by thousands who have not had an opportunity to look into the subject thoroughly for themselves, and will go a long way toward convincing the business community of the entire country that the provisions of the Wright law are eminently just and beneficial and the bonds issued in strict accordance with

that law constitute an investment of the highest worth. In connection with the letter of C. P. Huntington it should be stated that that gentleman referred the question of the legal status of the bonds to the Law Department of the Southern Pacific Company, and that after full investigation an answer was returned indorsing the legality of the securities in the most emphatic manner.

C. P. HUNTINGTON.

A Clear and Pronounced Statement in Favor of Irrigation.

SAN FRANCISCO, April 22.—*To the Editor of the Chronicle*—SIR: Your esteemed favor of April 17th is before me. The object of your writing, as derived from your letter, is to obtain from me an expression, either in the form of a letter or an interview, as to the solvency of bonds of irrigation districts formed in conformity with the provisions of what is known as the Wright irrigation law.

Prior to the receipt of your letter and the examination of the subject which it suggested I had but a general and necessarily vague idea of the provisions of the law. I did, however, understand clearly the objects of this legislation from its inception. Arid lands lying under favoring climatic conditions become highly productive and valuable by the application of water through artificial channels; in fact, this method of supplying to the land the necessary moisture to produce vegetation is far more satisfactory than dependence upon the uncertainty of seasons. The factors upon which successful field culture depend are climate, fertility, intelligent cultivation and moisture. The three first of these exist throughout the country and are under the control largely of men. You find the climatic conditions—that is, the clemency of climate—favoring vegetation. You can find the fertility of soil, and to this apply intelligent cultivation; but when these have been found the fourth essential in unirrigated countries is left to the varying vicissitudes of seasons. This fourth being under control, the round is complete, and the profit of field culture may be as steady and unvarying as the accumulation of interest. Irrigation, however, demands the employment of capital and the appropriation and application of water. The divers ownerships of the land and the water may give rise to conflicting interests. The entire fertility of the land being dependent on the water, there appears to be an apprehension on the part of those owning the land that the ownership of the water is an undue control and a menace to the rights and interests of the landowner. On the other hand, latterly the owners of irrigation systems, after having invested large sums of money in their construction and development, complain of a disposition on the part of the owners of the land to regulate by law the rate at which the irrigators are served with water in such a manner as to deny all reward to the capital invested.

Even a superficial examination of the Wright law proves that the object of the legislation was to combine the ownership of the land with the ownership of the water. The theory of the law is very comprehensible and simple. It provides that



Junction Tulare canal and Kaweah river.

an examination of a hydrographic system shall be made, surveys for ditches completed and a district or area subject to the system proposed to be constructed shall be formed. When these surveys are filed with the Board of Supervisors—the local legislative body for the county—an election shall be called, under the authority of the Supervisors, of the qualified electors in the district lying under the proposed ditch. When the necessary majority in favor of the construction of the ditch is obtained, then bonds shall be issued, from the proceeds of the sale of which the ditches shall be constructed and the water introduced into the country. The provision of the law makes these bonds a lien upon the land benefited, and the money to meet the interest, payments of the coupons attached to the bonds and to create a sinking fund for the final redemption of the bonds themselves is collected by a process of taxation simple and effective. Thus the value of the land subject to the system of irrigation constructed by money obtained from the sale of the bonds is offered as security for the payment of the interest and the final redemption of the funded debt.

If the bonds constitute a lien upon the land which may be enforced, if they are a valid mortgage, the question of their solvency would depend upon the relation of the value of the land affected by them and the amount of the bonds. It can scarcely ever happen that the amount of bonds necessary to be issued for the purpose of constructing an irrigating canal would ever reach more than a bare moiety of the value of the land subject to the irrigation system constructed. My information is that in most cases from three to seven per cent of the value of the land only is required to construct the means of its irrigation. I mean by this the developed value after water is applied. The land subject to the lien of mortgage bonds has an equitable interest in the water to be supplied by the irrigation system. There is in its ultimate sense a unity of ownership as to both land and water, an ownership which is common to all the land, and the application of the water is placed under such regulation as to make its distribution fair

and equitable. Thus all conflict or interest between the owners of the water necessary to fertilize arid lands and the owners of the lands irrigated is eliminated. The cultivator of the soil is willing to own lands subject to such a system, and is relieved of all apprehension of oppressive rates, while the capital employed in the development of the irrigation system was derived from the value of the land itself. Thus when the bonds issued in the construction of the system are redeemed, each owner will have a perfect ownership of the water in due proportion to his holding. These provisions appear to me to be wise, judicious and effective. The only remaining question that can be raised in the premises relates to the validity of the act. This is a question for judicial determination, and, as is well known to you and your readers, has been passed upon by the Supreme Court of the State in four decisions which affirm the constitutionality of the law and the validity of the bonds issued in conformity therewith.

The existing status of the case, then, appears to be: First—Irrigation confers greatly enhanced value on the lands subject to it. Second—The irrigation bonds issued as relating to any particular district, if such bonds have been issued in strict conformity with the statutes of the State, are a first mortgage upon the lands lying subject to the irrigation system constructed from the proceeds of their sale. The bonds are therefore a mortgage upon valuable real property. Third—As a rule and perhaps in all cases, the value of the land greatly exceeds the amount of the mortgage to which it is subject, and it should therefore follow that bonds being a legal and valid first lien upon property greatly in excess of their face value and interest are perfectly solvent securities, equal to if not better than the mortgages upon real estate which are deemed by bankers and investors to be preferred security for the repayment of loans.

If these considerations are not conclusive the people and the judiciary of California are resting under a delusion. If the legislation already had does not establish a perfect security in the bonds to be issued, then the acts passed by the Legislature

fall short of their design, and the design the people of California had in securing their enactment. We are scarcely at liberty to entertain the opinion that legislation developed in the thoughtful and careful manner which has attended the history of legislation upon this subject in this State is delusive; that the Judiciary Committees in the Legislature were in error; that the Legislature itself was mistaken, or that the highest judicial tribunal of the State has erred in maintaining the validity of the law and the solvent character of the bonds. Yours, very truly,

C. P. HUNTINGTON.

A. L. RHODES.

A Legal Opinion Upon the Wright Law and Its Operation.

To the Editor of the *Chronicle*—SIR: It is often said by capitalists, when solicited to purchase irrigation district bonds, that the bonds have recently been issued and the courts have not decided the legal questions involved in their issue, and that they will not invest in the bonds until those questions have been set at rest; that they will not rely upon the opinions of lawyers, but only upon the judgments of the courts. As capitalists are laboring under a misapprehension in that regard, or are wrongly advised by their counsel, and as the bonds of many of the districts are amply secured, and at the current rates are among the very cheapest securities now offered in the market, it is very desirable, both to the districts and the capitalists, that they should be apprised of the decision of the courts upon the legal questions involved in the issue of the bonds.

A brief synopsis of the decision of those questions will remove the most, if not all, of the doubts respecting the validity of the bonds of many of the districts.

The first question arising in the minds of capitalists is whether the district was legally organized.

First—"The Wright act"—the act of 1887 for the organization of irrigation districts—is constitutional, that is, it is not repugnant to any provision of the constitution of this State or of the United States. This was expressly so decided in the first two of the irrigation district causes which were appealed to the Supreme Court of this State: *Turlock Irrigation District vs. Williams*, 76 Cal., 360; *Central Irrigation District vs. De Lappe*, 79 Cal., 351.

The question of the constitutionality of the Wright act was necessarily involved in all the other cases decided by the Supreme Court, and the decisions in all of those cases having been rendered in favor of the districts, those decisions determined by necessary implication that the Wright act was constitutional.

In holding that the act was constitutional the court necessarily determined that the district could be formed by the Board of Supervisors; that the proceedings for its formation could be commenced by a petition purporting to be signed by the requisite number of freeholders filed with the board, and that due notice to all persons interested in the matter of the formation of the district could be given by a publication of the notice provided for by the act, stating the time and place

when and where the petition would be heard. For that is the mode provided by the act for the formation of a district, and it would be senseless and absurd for the court to decide that the act for the formation of districts was constitutional if they could not be formed in that mode. The act could not have been held by the court to be constitutional if the publication of the notice above mentioned was not due notice to all persons interested in the matter of the formation of the district, or if such persons were not thereby afforded an opportunity to appear and be heard in that matter.

Second—Irrigation districts are public corporations, in the sense that a city, a county or a swamp-land district is a public corporation, and, they being public corporations, the proceedings under the law providing for their organization are to be liberally construed, so as to give effect to the law. This was so held in one of the first of those cases that reached the Supreme Court—*Central District vs. De Lappe*, 79 Cal. 351. That salutary doctrine was laid down in the very able opinion of Judge Hayne, and was fully concurred in by the court. That doctrine is of great value to all the districts that have not had the proceedings for the organization of their districts and for the issue of their bonds confirmed under the provisions of the Confirmation act of 1889, for it enables and requires the court to disregard any irregularity in the proceedings that does not affect a substantial right.

Third—Boards of Supervisors have competent authority under that act to organize irrigation districts. In that regard their authority is quite similar to that which is exercised by them in the formation of swamp land districts, and in that respect their authority has uniformly been upheld for more than twenty years. This proposition is restated because it has been urged in some cases that the Legislature had not competent power to confer such authority upon boards of supervisors. But as already stated, the decisions to the effect that the Wright act is constitutional necessarily decided that the districts could be formed by those boards. The Constitution, article 2, sec. 5, requires the Legislature to prescribe the duties of the boards of supervisors, the language being the same as in the Constitution of 1849, and the court having uniformly upheld statutes authorizing those boards to form school districts and swamp land districts and to appoint justices of the peace, constables, etc., the question of the power of the 'Legislature' to authorize those boards to form irrigation districts is completely set at rest.

Fourth—The publication of the petition to the Board of Supervisors for the formation of the district, together with the notice stating the time when the petition will be presented to the board, if published in the manner and for the time required by the act, constitutes sufficient notice to all persons interested in the proposed irrigation district, or in lands composing the same—in other words, such publication constitutes "due process of law." This proposition, though decided in the cases above referred to, is again mentioned for the purpose of calling attention to the logical opinion of Justice Temple in one of the Dupont-street cases

(Lent vs. Tilson, 72 Cal. 401), and to the recent decision of the Supreme Court of the United States in one of the same class of cases, both of which hold that a published notice in such proceedings is due notice to all persons interested therein, and constitutes "due process of law."

Fifth—It has not been expressly decided by the Supreme Court—though it has been by some of the Superior courts—that the board can conclusively determine the questions as to the genuineness of the signatures to the petition and as to the petitioners being freeholders within the proposed irrigation district, but the decisions of the Supreme Court of this State and the larger portion of those of the other States and those of the Supreme Court of the United States leave no room to doubt that the true rule is that the determination of those questions by the board is conclusive as against a collateral attack. It is so held in the swamp land cases. (People vs. Hagar, 52 Cal. 111.)

In the cases of the districts which have had the proceedings for their organization and for the issue of their bonds confirmed, the decree of confirmation definitely determined that the petition was sufficient in form, that the facts therein stated were true, that it was signed by the petitioners, and that it and the notice were duly published. The decree placed all those matters beyond the reach of a successful attack by any person. In many of the other districts the above matters can be proved as facts, even if the decision of the board be held not to be conclusive of the truth of those matters.

Sixth—The board has competent authority to determine what lands shall be included within the proposed irrigation district, and its determination in that matter is conclusive as against a collateral attack. The doctrine in relation to the authority of the board in that regard was recently laid down by the Supreme Court in Modesto Irrigation District vs. Tregea, decided March 19, 1891. Attention is called to the clear and forcible opinion of the Chief Justice, in which many of the questions arising under the Wright act are carefully considered, and all of them are disposed of in favor of the district.

Seventh—There would seem to be no reason to doubt that the board can legally order an election upon the question of the formation of the district; or that the board may establish the election precincts and appoint the officers of the election, and canvass the returns of the election, and declare the result. All those matters are steps in the proceedings for the organization of the irrigation district, and it has been held, as above stated, that the board has power to organize the irrigation district.

Eighth—There is no room to doubt that the notice of the election provided for by the act, is a sufficient notice. A notice published for three weeks is unquestionably due notice of any election, so far as regards the time.

Ninth—The record of the canvass of the returns of the election is conclusive. All the cases so hold. If the vote of the electors was in favor of the organization of the district, and the board, in its order, has defined the boundaries of the district, and the order has been filed in the proper

Recorder's office, and if the proceedings of the board were had in conformity with the provisions of the act, the district is a legal and valid irrigation district.

Tenth—After the district has been duly organized, the proceedings of the board of directors in issuing the bonds are mainly ministerial, and the only questions that could arise would be merely whether the provisions of the act had been pursued; and those provisions are plain and easily comprehended, and may be readily followed.

Eleventh—The board of directors may estimate and propose the amount of bonds needed for the construction of the water-works. The estimate is proven by the record of the board. The order calling an election upon the proposition for the issue of the amount of bonds mentioned in the estimate, the notice of the election and the canvass of the returns of the election can be proven in the same manner as like facts would be proven in case of the issue of bonds by a county. If such proceedings have been confirmed, the decree of confirmation conclusively determines that those proceedings have been duly and regularly had. If there has been no decree of confirmation, counsel can readily ascertain whether those proceedings are regular.

Twelfth—The authority granted to any public corporation to create a debt necessarily carries with it both the power and the duty to raise the necessary funds for the payment of the debt contracted by it, and if no other means are specially provided by the law applicable to the corporation the corporation must raise the necessary funds by assessment or taxation. This proposition has often been laid down by the Supreme Court of the United States and the State courts, and there are no decisions to the contrary. Assessments upon the lands of the district being the means provided by the Wright act by which the funds are to be raised for the payment of the debt created by the issue of bonds, they must be levied as the debt matures and must be repeated until the debt is satisfied. In Turlock vs. Williams, supra, the power of the district to levy assessments was affirmed, and that doctrine has not since been questioned by the court.

Thirteenth—An irrigation district can be compelled to levy and collect the necessary series of assessments, in order to produce the moneys required for the payment of the principal and interest of the bonds. In addition to the remedy by mandamus to compel the levy and collection of the necessary assessment for the payment of the bonds, the amendment of the Wright act, passed by the last Legislature, authorizes the Board of Supervisors to levy an assessment in case of a default by the board of directors. The question of the validity of that amendment has not been passed upon by the court; but there would seem to be no ground upon which it can be held that it is invalid. The Constitution provides that the Legislature shall prescribe the duties of the Boards of Supervisors; and as the court has sustained laws requiring the boards to organize swamp land districts, and irrigation districts, to levy school district taxes, to appoint Justices of the Peace, constables,

etc., it would seem that the Legislature may, with propriety, prescribe that this duty shall be performed by the Boards of Supervisors.

Fourteenth—A sale of a parcel of land within an irrigation district, in proceedings to collect an assessment, does not discharge or exempt such parcel of land from the lien of any future assessment. In that respect the assessment is like a tax, which may be levied annually upon all the lands within the county for the payment of the debt of the county.

Fifteenth—Mention is above made of confirmation proceedings, and the effect of the decree of confirmation is alluded to. Only a few of the districts have procured such decrees, but it is believed that the proceedings on behalf and by many other districts have been conducted with such care that the districts may procure decrees of confirmation should they apply for them. In *Modesto Irrigation District vs. Tregoe*, above cited, the court affirmed the decree of confirmation rendered by the Superior Court.

The effect of such a decree was declared in *Crall vs. Poso Irrigation District*, decided December 15, 1890. In that case a landowner sought to enjoin the sale of the bonds, he relying upon almost all conceivable objections to the proceedings for the organization of the district and the issue of the bonds, and the district in answer to his complaint, and as a bar to the relief sought by him, set up the decree of confirmation; and both the Superior and the Supreme Court sustained the answer and held that the confirmation decree was as conclusive as it was possible for a judgment to be, and that it absolutely precluded the plaintiff from setting up any of his objections.

To the suggestion that the Supreme Court of the United States may reverse the decisions of the Supreme Court of the State it may be answered that the Supreme Court of the United States always follows the decisions of the State court in its interpretation and construction of the Constitution and statutes of the State, unless such interpretation and construction are repugnant to some provision of the Constitution of the United States. The only ground thus far presented upon which it is claimed that the proceedings of an irrigation district can be attacked as repugnant to the Constitution of the United States is that the landowner did not have the requisite notice of the proceedings before his lands were charged with the lien of the bonds—that the published notice of the time and place of the hearing of the petition for the formation of the district, and the notice of the bond election, did not constitute "due process of law." The cases in the Supreme Court of the United States holding that in proceedings of that character published notices like those provided for in the *Wright* act do constitute due process of law are very numerous, among which is the recent decision in one of the *Dupont-street* bond cases, and there are no cases to the contrary. Respectfully, A. L. RHODES.

F. G. NEWLANDS.

A Business Man's Opinion of the Law and Its Effects.

We are all familiar with the evolution of irrigation in this State. It took many

years to determine the practical question as to whether irrigation would pay. When this was fully determined in the affirmative legal obstacles arose between the appropriator of the water to beneficial uses on the one hand and the riparian owner on the other. The litigation was long and protracted, and resulted in a victory for the riparian owner. A doctrine of the law entirely unsuited to our conditions having been fastened upon us, the next step was to relieve ourselves of its embarrassments by passing laws which would permit the condemnation of riparian rights and which would put it in the power of communities, by means of great co-operative effort, to free themselves from obstruction and rapacity.

And so the *Wright* bill became a law. Its purpose was to enable the people of a particular district capable of being supplied with water from a common source to organize into a public corporation with power to condemn, to issue bonds for contemplated irrigation work, and to tax the property within the district for the purpose of paying the interest and principal of the bonds. Numerous districts have been formed under this law, each of which proposes to issue bonds to a greater or less extent. These districts find it difficult to negotiate the bonds. They claim that the law under which they are issued has been upheld against every form of attack by the Supreme Court; that the requirements of the law have been strictly complied with in all their proceedings; that the security of the bonds, consisting of all the lands within the district, is ample, but that the moneyed men of San Francisco are timid and apprehensive and refuse to take the bonds, and that this very timidity and apprehension upon the part of San Francisco capitalists is a source of weakness in the negotiation of the bonds abroad. They claim, and I think with justice, that San Francisco has always been skeptical of the capacity and resources of the agricultural parts of the State, and they ask the bankers of San Francisco and capitalists generally in a matter of such vital importance to the State at large to institute some method of investigation of the legality and practicability of the various schemes, as a guide to expected investors.

It will hardly be questioned that the future of California depends upon irrigation. The great fruitfulness of the soil caused by the application of moisture to arid lands will be the source of California's future wealth and development. It is to be hoped, therefore, that this law will be operative, and that all the proceedings in the various irrigation districts are without legal flaw, for if there is danger of a single district successfully repudiating its bonds the irrigation interests will be seriously menaced. Various means have been adopted by the irrigationists to secure the public confidence for their bonds. They have appeared before committees of the Produce Exchange and of the Chamber of Commerce, and have sought to obtain an indorsement of them as a valid security. The difficulty about this mode of presentation of the matter is that such bodies can only indorse irrigation in a general way; they cannot be expected, without thorough investigation of the proceedings in each district and the

practicability of each scheme, to be able to give an indorsement which will be of any real weight.

The irrigationists then appealed to the bankers, stating that they were willing to submit the question of the legality of the bonds of each district and the practicability of the scheme to a body to be appointed by the bankers themselves, consisting of able lawyers and experienced engineers, and that they, the irrigationists, would pay the expense of the investigation. This proposition seemed to be favorably entertained by the bankers, and at a conference held they determined that it would be an impossible thing for every individual bank to inquire into the matter and that it would be best to refer the matter to the Clearing-house, which consists of the associated banks of San Francisco. And so the matter went before the Clearing-house, and they, while professing general friendship for the cause of irrigation, declared by resolution that it was not within the purposes of their organization to make such an inquiry, and hence dismissed the matter from consideration. So that we find that in this process of evolution a great plan for co-operative effort has been worked out, offering, if the law is constitutional and the proceedings legal and the scheme practicable, ample security for any reasonable investment; and yet the negotiation of the bonds lags and the cause of irrigation suffers, and the irrigationists are almost discouraged.

It seems to me that this is a public matter which requires great consideration by all our capitalists. It is to the interest of all that this law should be carried out, that its requirements should be complied with, and that the scheme in every case should be practicable.

Particular attention should be paid to the danger of repudiation of the bonds in districts where the scheme should prove impracticable, and hence the importance of organizing some body of men which shall report with the authority of experience, ability and character upon both the legality and the practicability of each scheme. The proper persons to move in this matter are the bankers themselves. They should, as the representatives of organized capital, select lawyers to inquire into the legality of the proposed issue of bonds, and engineers to investigate the practicability of each scheme. The report of such lawyers and engineers would have great moral weight. Such action would do much to clear up the doubt and confusion which now exist; would kill off and destroy impracticable schemes; would facilitate the negotiation of the bonds in districts whose schemes were practicable; would invite the confidence of foreign investors and would greatly promote the cause of irrigation. It seems to me that this is the time for a display of some public spirit on the part of our banking institutions, even though such action would be somewhat outside of the line of their general operations. It would involve no legal liability on the part of the banks and would involve no expense to them, for such expense would be borne by the irrigationists. The unwise and impracticable schemes would be weeded out. If the law should prove defective suggestion would be made by the lawyers for its amendment. If a particu-

lar scheme lacks merit it would be condemned by the engineers. If it has merit in some features, but requires modification or change in its plans, such modification or change would be suggested.

Above all things it is necessary in this State to create the sentiment that there shall be no repudiation of irrigation district bonds. A strong moral sentiment should be created in favor of making the security so absolute that no district shall attempt repudiation, and the law should be so shaped, and I understand it is so shaped, that in case of repudiation authorities outside of the officers of the district would take up the work and compel the taxation necessary to pay the interest and principal of the bonds. The good faith and sincerity of the people of this State should be demonstrated in this matter, and there can be no more important step in the demonstration than would be the action of our principal financiers in organizing thorough and accurate examination into the legality and the practicability of schemes presented. The latter is as essential as the former. There will be no disposition to repudiate the obligation imposed by a practicable scheme; there will be every disposition to avoid the burthen imposed by an impracticable scheme.

I trust that the request of the irrigationists, reasonable and fair as it is, will be complied with and that immediate steps will be taken to make an exhaustive inquiry into the various irrigation schemes of the State.

F. G. NEWLANDS.

SAN FRANCISCO, June 4, 1891.

C. C. WRIGHT.

The Author of the Law Explains Its Provisions Clearly.

What are the elements of the plan of irrigation by the district law of California?

First of all, it is the association of all those who have like interests into a municipal corporation with all the powers of concentrated effort which such association in any case affords.

The formation of the corporation is effected in substantially the same manner as other public corporations are effected in this State, subject, however, to the power of the tribunal before whom the organization is effected to modify the boundaries to be adopted in such a manner that those, and only those, who will be benefited by the formation will be included. When thus organized the corporation is provided with officers, who are endowed with the functions necessary to enable them to effect the objects for which the corporation was effected. First there is a board of directors whose office it is to manage and control the affairs of the district in substantially the same manner as do the Board of Supervisors manage and control the affairs of the county. There is provided an assessor, a collector and treasurer, whose powers and duties are analogous to the corresponding officers of a county.

This association has but a single purpose. All its corporate power is applied to its accomplishment. This purpose to be accomplished is the irrigation of all

lands within the municipality.

This end necessitates the construction of works, and this again large expenditures of money.

The corporate power is endowed with the necessary functions to meet these ends.

When such a public corporation has been formed the first question to determine is, What plan and system of works will best subserve the interests of those concerned? Through the agency of its officers this question may always be correctly answered.

The same power which a county possesses to obtain and adopt plans for the construction of any public work is possessed by an irrigation district. It is made the duty of the board of directors of a district to employ a competent engineer or engineers and to cause an exhaustive examination to be made to the end that the best of many possible systems may be determined. With the determination of the system there is coupled the further question of its cost. This latter question, like the former, is left to the expert opinions of skilled engineers.

When they have made an exhaustive examination of the problem and have determined what the cost will be the board of directors either adopt or reject the report. If they adopt it they submit to the electors of the district the question whether or not the bonds of the district in the amount determined shall be issued. If, at such election, the issuance of bonds be authorized, the board causes bonds to be issued. These may be sold and the proceeds applied to the construction of the works determined upon.

When their report upon the plan and its cost (always accompanied with specifications and details) has been adopted by the board of directors, the construction of works is accomplished under the time-honored plan of competitive bidding. The board of directors advertise for bids for the construction of the whole or some designated portion of the work to be done, and the work must be awarded to the lowest responsible bidder, provided such bid be satisfactory to the board, otherwise they may reject all bids.

The successful bidder must give an ample bond for the completion of his contract in accordance with the adopted plans and specifications. Every safeguard is thus provided that the work will be done in the best and most economical manner. In this manner all works necessary to a complete distribution of the water are constructed.

Thus the district acquires the water at bare necessary cost. The land owner is not subject to annual exactions from those who deal out water as an article of merchandise, and is not subject to the liability of failure to get it at all, in consequence of the failure of the seller to fill his contract. In other words, the land owner by this plan owns the water, and sufficient water for the irrigation of his lands. Not only does he own it, but it becomes and is an appurtenance to his land as much as the air which he breathes or the sunlight which warms into life and fruition the products of the soil.

Which subserves the interests of the farmers best—that system under which he usually buys water for irrigation of some private dealer, always to the latter's profit of course, and generally at a large

profit, too, or that system under which at the bare necessary cost he acquires the indefeasible title to all the water he requires, and a title, too, as enduring as the soil to which it becomes an appurtenance?

A kindred subject at this time is the character of the security afforded by the bonds of a district formed under this law.

To the intelligent business man who gives the subject a full examination must come the conviction that so far as the law of the case is concerned there is nothing further to be desired.

The law of 1887 providing for the formation of districts has in three well considered cases been declared to be constitutional in all its provisions.

This question having been determined it necessarily follows that a district formed in accordance with its provisions is a valid municipal corporation possessing all the powers which the law by its terms confers.

One of the chief powers conferred is the power to issue and sell bonds and apply the proceeds thereof to the construction of works.

Then it follows, if the law be constitutional, that bonds issued by a district in accordance with its provisions are a valid promise of the district to pay.

The law by its terms makes the bonds of a district a lien on all the lands in the district.

But how shall we know what is beyond question and beyond the power of impeachment a valid district, and what are valid bonds to the same unqualified degree?

The question has been answered in the most conclusive manner.

A statute, old in the principles involved, but of entirely new application, was enacted by the Legislature of 1889, providing for the confirmation by the courts of the State of all proceedings had for the organization of a district and for the issuance of its bonds.

This decree of confirmation when once had determines conclusively and forever the validity not only of the organization but also of the bonds of the district and of each and every step required by the statute to be taken in the premises.

Construing the effect of this confirmation act, our Supreme Court has said that the decree of confirmation "is conclusive upon all the world." Expressed in popular parlance, this means that at no time after the decree becomes final will any objection be heard by the courts to the validity of the district or of its bonds. This confirmatory act throws around irrigation district bonds a safeguard never heretofore vouchsafed to municipal bonds of any character in any State of the Union.

Of no other municipal bond in or out of California can it be said that the courts have decreed in advance of its being thrown on the market that it is valid beyond the realm of question or impeachment.

A county or city bond is provided with no such safeguards against legal objections. There is no means whatever provided for obtaining the decree of the courts that a county or city bond is valid beyond further question.

When the capitalist has appreciated the idea of a confirmed irrigation district bond it would seem that he ought to feel

that there is but one further question to be answered, and that is, are the lands in the district of sufficient value to afford a safe security for the bonds issued?

The question of value as an element of the security afforded by such bonds is the only one not fully answered by the decree of the courts. This the capitalist must answer for himself precisely as he does in every case where he loans money on a mortgage.

C. C. WRIGHT.

J. E. JARBOE.

A Brief But Emphatic Indorsement of the Law.

I have examined the act of the Legislature, approved March 7, 1887, the various acts amendatory thereof and supplementary thereto, and the decisions of the Supreme Court of this State touching the subject-matter of said act, and, as the result of my examination, have satisfied myself that the Wright Act has been held to be a constitutional act by the courts of this State, and that bonds issued under provisions of said act and acts supplementary thereto, have been held by the courts to be good and valid securities, provided the formalities required by said act in the organization of irrigation districts have been strictly complied with, and that the proceedings had upon the issuance of said bonds have been taken in strict compliance with the said acts.

I am of opinion that an intending purchaser of bonds of these irrigation districts would only have to satisfy himself, first, of the regularity of the proceedings, as above indicated, and secondly, of the value of the lands in the districts as compared with the burden of taxation imposed upon them by the bonds, and if, on examination, these questions were determined in favor of any proposed series of bonds, that such bonds would then be a safe and valid security.

I have examined the bonds of one or two districts organized under the Wright act, for clients intending to purchase the same, and upon satisfying myself, as above, of the regularity of proceedings, have advised my clients that all they have to do is to satisfy themselves of the value of the land embraced in the district. Of course the legislation of the session of 1891 has not been passed upon by the court and this opinion covers bonds issued up to the end of the year 1890. Yours very truly,

JNO. H. JARBOE.

BUSINESS MEN.

THEY SAY IRRIGATION BONDS ARE SECURE.

Many Have Bought Large Amounts of the Stock and Consider the Security Ample.

The business men of San Francisco express the fullest confidence in the irrigation bonds issued under the provisions of

the Wright bill. Many have bought a large number of the bonds, and are perfectly satisfied with them. The judgment of the business men of this city is founded upon deep insight into the financial affairs of the State, and where so many of them express the utmost confidence in a certain class of investments the experience of the past proves that this confidence is well founded. In the succeeding interviews will be found expressions of opinion from many of the most prominent business men in the city:

James G. Fair, 230 Montgomery street: "I have not myself looked into the matter of the security of irrigation bonds, neither have my attorneys, consequently I cannot give a decided opinion. On general principles, however, I should say they were good. If a district is legally organized, if the land is fertile and productive, if the bonded indebtedness does not exceed the value of the land, then I should say irrigation bonds are a good investment, and something that I would like to take hold of myself. The security offered is California land—as good security as can be found anywhere—a security that cannot burn up or be destroyed, and whose value is always increasing. The interest paid, 6 per cent, is large enough to attract capital, and I see no reason in the world why the bonds should not meet with a ready sale. If the districts would individually have their bonds passed upon by some competent lawyer and engineer it would remove the only obstacle that I can see in the way of their becoming great favorites with investors."

Captain W. L. Merry of Merry, Faulk & Co., 125 California street: "I was a member of the Chamber of Commerce committee which recommended bonds issued under the Wright irrigation law. I was in favor of the bonds then, and the more I study the matter the more strongly am I impressed that they are good investments. If a mortgage on a ranch is good security then these bonds, secured as they are by a first lien on the same ranch, are even better secured than is the mortgage. If a farmer won't or cannot pay his taxes then his land is sold and the proceeds go, first, toward the payment of his taxes, in which is included the irrigating tax; and secondly, what is left over goes toward the payment of his mortgage, if he has any standing against him. The Supreme Court has repeatedly said the bonds are valid, legal, and are well secured. I don't see what better security a man could ask for his money."

W. T. Y. Schenck, 222 Market street: "You ask me if I think the bonds issued under the provisions of the Wright Irrigation bill are legal, and are well secured. Of course they are. I do not see how any man who wants to invest money, especially a large amount, can ask for a better investment. In the first place, the bonds bring 6 per cent interest, which is more than can be obtained generally in Europe or the East. In the second place, the bonds are perfectly secured by a first lien on the lands they cover. In the next place, they have been tested again and again in the Supreme Court, and the decision, every time, has been in their

favor. You can quote me as saying that I believe heartily in irrigation bonds, and consider them perfectly safe."

L. L. Baker of Baker & Hamilton: "You ask my opinion of irrigation bonds. My answer is, 'The bonds are velvet.' I don't know where a man can put his money and have it better secured. It is a better investment than real estate, for the bonds are a first lien on the lands they cover and are preferred to a first mortgage. Besides that, the minute you put water on a man's land you increase its value and productiveness. If the land was good for the cost of putting water on it before irrigation, then certainly it is better security than ever for the bonds after the water has been secured."

A. W. Huggins of A. I. Hall & Son, 530 Market street: "I have not made as thorough a study of the question of the value of irrigation as some have, but I have gone into the matter sufficiently to come to the conclusion that these bonds offer first-class opportunities for investments. They are well secured and the Wright law has stood all legal tests."

J. C. Johnson, 400 Market street: "There is no doubt in my mind about the validity of the bonds. I believe the security offered is 'gilt edged.' Take, for instance, a district of 156,000 acres—one that I know of. Its assessed value as figured up in the Assessor's books is nearly \$3,000,000. Its real value, or selling price, is \$5,000,000 without water. This district issues irrigation bonds to the amount of \$750,000. Now, will any man say that \$5,000,000 isn't a proper security for \$750,000? A man that won't accept that as security wouldn't loan a four-bit piece on the State of California. Besides that, if the value of the land in the district was \$5,000,000 without water, does not its value increase as soon as water is put upon it? Of course it does, and that makes the bonds still further secured."

C. O. Hooker, of Truman, Hooker & Co., 421 Market street: "As regards the irrigation bonds issued by irrigating districts, I consider them first-class and that there can be no question as to the value of the security offered. As I understand the matter the bonds constitute a first lien on the land, that is they are preferred even to a first-class mortgage. Now a mortgage is generally considered good security. But in the case of the bonds the security is even better."

Isador Jacobs, of the A. Lusk Canning Co.: "I was chairman of the Chamber of Commerce committee which passed on the worth of the bonds issued under the provisions of the Wright law. I believe that these bonds are amply secured; in fact I consider them better than bonds of the city and county of San Francisco, and in this belief I am supported by the recent decisions of the Supreme Court. These decisions prove that the action of the State Legislature which passed the Wright bill was legal and constitutional, and that the legal conditions were fully complied with. The irrigation bonds are as strong as any bonds offered on the market, not excepting even the bonds of the State of California. These bonds are secured by a first lien on the land within the irrigated district, and that means that they are

better secured than are notes which are secured by a first mortgage on real estate. I do not believe there can be any question as to the bonds being well and perfectly secured."

C. J. Wetmore of the State Viticultural Commission: "I am very glad to see the bonds issued by different irrigation districts rapidly coming to the front in point of popular favor. I believe the bonds are gilt edged and that they rest on velvet security. They are indorsed, not only by the Legislature, but by the highest State tribunals. The best financiers in the city have purchased the bonds, and say that as an investment they cannot be surpassed."

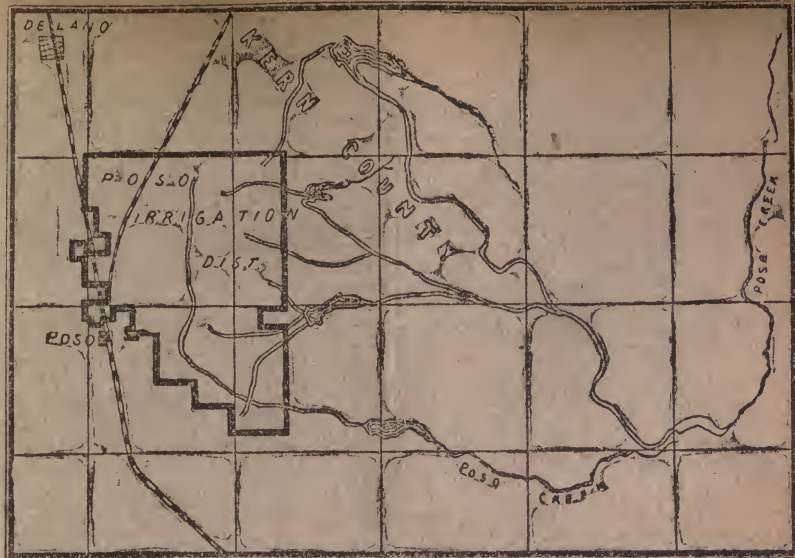
O. F. Willey, carriage manufacturer, 317 Montgomery street: "I do not know very much concerning irrigation bonds. They are out of my line, and I haven't got enough land in the irrigating sections to make me study the matter up. But I have talked with many men who have examined into the matter, and they unite in saying the bonds are well secured, and will, by putting water on the land, be of vast benefit to the country. What I do know about the bonds leads me to believe they are perfectly safe and warrant the careful attention of investors."

R. H. Pease, of the Goodyear Rubber Company: "I consider the irrigation bonds to be a good and safe investment. They pay an interest of 6 per cent, which is as good a thing in the way of a large investment as can be asked for. Then they are safe because they are secured by the fact that they are a first lien on the land. I believe that investors should be encouraged to take up the bonds."

A. I. Church, of Dolliver & Brothers, 573 Market street: "I have not made the careful examination which would warrant my making an unconditional statement as to the worth of irrigation bonds; but of this I am certain, viz: That if the bonds are legal, if their amount is not in excess of the value of the lands, then they must be as good an investment as a man could make. Those who have examined into the matter tell me the bonds are well secured, and what little I know about them leads me to the same conclusion."

F. W. Marvin, of the Williams-Marvin Company, 569 Market street: "I have property in the southern portion of the State, adjoining the Alessandro irrigation district. My attention has thus been called to the matter of the value of the bonds, and I have examined very thoroughly the different systems presented. I am convinced that if the legal provisions of the Wright Irrigation bill are legally conformed to (and there should be no reason for anything otherwise) then the bonds are legal, valid, and rest on unquestionable security. I know of no better investment that could be made."

W. H. Peckham, agent of the San Jose Woolen Mills, 541 Market street: "I confess I do not know as much as I ought to about this matter of the irrigation bonds, and consequently I can only give a conditional opinion as to their merits. But if the bonds are legal, as I understand the courts say they are, and if the Wright irrigation bill is legal, as I believe is unquestioned, then the bonds rest on ample



Map of Poso district.

security, and ought to satisfy any capitalist who is seeking a good investment."

Philip Lippitt of Lyons, Lippitt & Co., 417 Market street: "As I understand it the bonds constitute a first lien on the property, and are preferred to all other liens. This being the case, I cannot see any reason why the security is not perfectly ample and satisfactory, and why the attention of investors should not be attracted toward the purchase of irrigation bonds issued under the provisions of the Wright law."

W. F. Bowers, 409 Market street: "If the values of the land included in an irrigation district are correct, and if these values exceed in a certain degree the amount of the bonds which constitute a lien upon the land, then I can see no reason why the bonds do not rest on gilded security, and why they should not meet with a ready sale."

E. M. Root of Root & Sanderson: "I consider the bonds amply secured. You take land that is of fair quality, in any valley of the State, and it can well afford to go into debt to secure water for irrigation purposes, and the land is good security for the debt thus incurred. If the bonds are secured by a first lien on the land, then I can see no question but the security is ample."

O. B. Culver, manager for Le Count Brothers: "The bonds seem to me to be well secured, and as they pay a good percent on the capital invested, I see no reason why they should not be promptly taken up and prove a popular as well as safe investment."

N. T. Romaine, manager of I. S. Van Winkle & Co., 415 Market street: "I believe that when the legal conditions are complied with and the land covered by the bonds is of fair quality, the bonds are abundantly secured. I see no reason why any one seeking investment for capital,

large or small, should object to taking hold of the irrigation bonds."

W. W. Montague of 309 Market street: "I am greatly interested in irrigation matters as associated with the workings of the Wright irrigation law. I believe the law to be perfectly constitutional, and the bonds issued by means of it to be perfectly secure. Lands in many portions of the State are almost entirely unproductive without water, but with water they make the desert places to bloom and blossom. This water can only be obtained by irrigation, and the best way to secure irrigation is by means of the Wright bill."

I. H. Morse, of the King-Morse Canning Company: "I am thoroughly and heartily in favor of any movement which will aid in the development of the State and in increased immigration. I believe that the provisions of the Wright bill will accomplish a vast deal toward this end, especially as the bill rests on constitutional grounds, and has been pronounced upon favorably by the highest judicial tribunals. The irrigation bonds seem to me to be perfectly sound, legal and valid in every particular."

Charles Holbrook, of Holbrook, Merrill & Stetson: "If, as I understand, the irrigation bonds constitute a first lien on the lands upon which they are issued, then there can be but little question as to their security, or the wisdom of those who purchase them as an investment. The land certainly is worth more than the face of the bonds, and the value of the land increases as soon as water is carried to it."

James Linforth, 37 Market street: "I am perfectly satisfied the bonds are constitutional and well secured, provided the preliminary work of organizing the district, making surveys, issuing bonds, etc., has been carefully and legally attended to. If these preliminaries are all right, then the bonds as an investment cannot be surpassed. I would not object

to loaning money on the bonds myself."

Porter, Slessinger & Co., 7 Battery street: "We have looked into the matter pretty thoroughly and have sufficient confidence in the bonds to be willing to take them in return for any amount of merchandise which may be ordered from us. That means that we regard the security as ample."

M. Weil of M. Weil & Co., 11 Battery street: "I hold some of the irrigation bonds myself and consider them a first-class investment. Their worth depends on whether the district is organized and whether the value of the land is more than the amount of the bonds issued. Under these conditions I consider the bonds of any district good."

L. Hirsch of W. Cohen & Co.: "I am interested somewhat in the bonds of the irrigating districts and I consider them good and amply secured. I see no reason why the bonds should not receive the support of the business community and be rapidly taken up. They pay 6 per cent interest semi-annually, and that is a better return for the money invested than many a man receives in his business."

Levi Strauss, of Levi Strauss & Co.: "I believe the irrigation bonds are a good investment. They are well secured, pay a good interest and their security is California land, which is always valuable as soon as water is placed upon it. If the irrigation districts are legally organized and if the water can be placed on the land there can be no question but that the bonds are amply secured."

P. N. Aronson of B. Blumenthal & Co., 18 Battery street: "I hold some of the bonds myself, and that is pretty good evidence that I consider them amply secured. They are being taken up by some of the most conservative capitalists in the State, who have examined them carefully and invest in them as soon as they are satisfied as to the legality of the proceedings under which a district is organized and as to the present and future value of the land."

G. G. Wickson of G. G. Wickson & Co., 3 Front street: "There is a great deal of land that is now unproductive in California because it lacks water. Irrigate it and it becomes useful and valuable. If it is irrigated by means of the Wright act, then the bonds issued for this purpose are well secured by the land. I consider the bonds a secure, satisfactory and safe investment, and they can be safely issued on a basis of one-third more than the present assessed value of the land."

M. M. Johnson, of Hegler, Johnson & Co., 111 Front street: "I know a good deal about irrigation bonds, and all I know about them is in their favor. I own, with others, considerable land in an irrigation district, and I know how much irrigation has added to the value of the land, and how secure the bonds are which are issued on the land. Five years ago the land went begging almost at \$22 an acre. Now, through the results of irrigation, that land is worth from \$250 to \$300 an acre, and that amount is offered for it. If that is not a practical proof of the value and security of the bonds I do not know what is."

F. E. Brigham, of Brigham, Hoppe & Co., 129 California street: "I can see no reason for doubting in the least the value

and security of irrigation bonds. I consider them first-class in every particular. The Wright bill is constitutional, the courts hold it legal, the land is well worth the face of the bonds and many of the most conservative men in the city are now investing in them largely. Eastern and foreign capitalists who desire secure investments at 6 per cent interest on long time can well afford to purchase the bonds."

S. Feder, of Rosenthal, Feder & Co.: "I think very favorably of the irrigation bonds and can see no reason why they are not fully secured, provided, of course, the irrigation districts are organized according to law and the land is good and can be irrigated."

A. A. Hooper, of Hooper & Jennings, 213 Front street: "I believe in the security of the bonds, and for this reason. Here is a section of 150,000 acres of good land, but which is comparatively unproductive for lack of water. It is assessed at \$2,500,000. Plenty of water can be obtained by an expenditure of \$750,000 for dams, ditches, etc. Bonds are issued for that amount (\$750,000), and these bonds are a first lien on the land. Now, who will say that these bonds are not well secured, when the land before irrigation is worth \$2,500,000, and after water is obtained is worth \$5,000,000? That land is ample security for \$750,000."

R. D. Laidlaw, manager on the Pacific coast for P. Lorillard & Co., 217 Front street: "I consider the irrigation bonds well secured, because they are secured by California land, which, I believe, is the very best of security. To establish irrigation systems requires money—from California, from the East, from Europe; but every cent thus expended, if secured by the land on which the water is placed, is as safe as if invested in United States Government bonds."

William Haas of Haas Brothers, 100 California street: "I consider the bonds to be amply secured by the land. I think the bonds are not only good in themselves, but that they will prove of immense benefit to the State, as their sale supplies the means of adding greatly to the value and productiveness of the land."

C. P. Doe of Russ, Sanders & Co., 121 Davis street: "As to the question whether or no I believe in the security of irrigation bonds, I answer, 'Yes, on certain conditions.' If the districts are organized according to law, if the land is good, if water can be brought upon it at not too great expense, then I do not think there can be any doubt but the bonds are as secure an investment as can be found."

Fred L. Castle of Castle Bros., 200 Davis street: "I do not know as much as I would like to about the bonds from personal inquiry and research, but what I do know leads me to conclude that they are as secure as any investment that can be made. It is barely possible that there may be legal conditions not fully complied with by some districts which may invalidate the bonds. But, as a general proposition, I consider the securities valid and the bonds well secured."

C. Schulz, manager of the firm of Wieland Brothers, 210 Davis street: "I am enthusiastically in favor of irrigation and I cannot think of any better method of

securing the irrigation of large portions of the State than that embodied in the Wright bill. In fact, it seems to me the best and practically the only means by which residents on a large area of land can secure its proper irrigation."

J. Johnson of McDonogh & Johnson, 404 Davis street: "Provided the Wright act is legal, the districts comply with its conditions and the land is more in value than the bonds, then the bonds are secure and worthy of the confidence of the business community and investors generally. I understand the bonds are rapidly growing in public favor, and are being purchased largely by many of our most conservative and cautious capitalists."

I. W. Taber, corner of Market and Montgomery streets: "I am convinced that irrigation is one of the largest factors entering into the prosperity of this State. The best way to secure irrigation is to adopt the methods incorporated in the Wright bill and to issue bonds, the sale of which supplies the means for building reservoirs, canals, etc. These bonds are amply secured by the land irrigated, and this security increases with the constantly increasing value of the land. I consider the bonds a good and safe investment, and they will soon attract the attention of Eastern and foreign capitalists."

H. S. Crocker of H. S. Crocker & Co., 215 Bush street: "I consider the bonds a perfectly safe investment. They are secured by the land, which cannot burn up, run away, be stolen, or in any way be destroyed. Its value is constantly increasing, especially if water for irrigating purposes be placed upon it. Land worth now \$15 an acre will probably never be worth less than now. I cannot see how any man looking for investment could ask for anything better."

J. R. Hebborn, member of State Board of Equalization: "In traveling over the State I have made many inquiries as to the way people regard the Wright irrigation law, and as to the value of the bonds issued by means of it, and I find everywhere people expressing the greatest confidence in the law and in the bonds. The Wright law is constitutional and the bonds will pass muster anywhere."

E. Dewitt, director in the Tulare Irrigation District: "The longer I am connected with these irrigating enterprises and the better I become acquainted with the Wright irrigation law the more am I satisfied that the law will accomplish wonderful results for California, and that the investments offered by irrigation bonds will grow in favor. The land is ample security for the bonds when they are first offered, even before water is brought in. After water is obtained the bonds are secure for many times their original value. There is no trouble in collecting the assessments for the payment of the interest or the principal."

Thomas Flint of San Juan, San Benito county, Cal.: "I believe in the Wright act, especially for the districts where the land-owners of themselves are unable, through lack of means, to bring in the water. If the provisions of the Wright act are legally carried out; if the water is actually placed on the land and the resources of the district properly developed, then there can be not the least question but that the bonds will be amply

secured, and will meet with a ready sale."

General W. H. Dimond, Superintendent of the United States Mint: "I have looked into the matter of bonds issued under the provisions of the Wright law to the extent of believing they are amply secured, and that their sale should be encouraged. They are as secure, to my mind, as are the city gas and water stocks, the value and stability of which are unquestionable."

W. B. Wellman, of Wellman, Peck & Co.: "I cannot see where there is any room for question as to the security of the bonds. They are a first lien on the land, and the courts say the Wright law and its provisions are constitutional. This being so, if the irrigating districts are properly and legally organized, then the bonds are secured by land the value of which must be many times greater than the amount of the bonds."

George T. Hawley, of Hawley Bros.' Hardware Company: "In a general business way, I should say the bonds are well secured. Of course a man wants to be sure the general legal requirements are complied with, and that the land is worth the amount of the bonds. On general principles I am convinced the irrigation bonds, as issued under the Wright law, are perfectly good and the security ample."

A. B. Spreckels, of J. D. Spreckels & Bros: "I believe the bonds are good and are well secured. The land certainly ought to be worth the amount of the bonds, and the interest paid, 6 per cent., ought to attract to the bonds the attention of outside capital. The investment seems to me to be in every respect a good one, and worthy of the confidence of the business community."

Brown & Adams, 409 Battery street: "If the land is good and the legal requirements of the Wright Irrigation bill are complied with, then the bonds are unquestionably good."

H. L. Whipple of Murphy, Grant & Co.: "If I had money to invest where I wanted it safe and bringing in a fair rate of interest I would not want anything better than the irrigation bonds. California land is worth a great deal and will continue to increase in value, especially when you get water upon it. Consequently if land which is included in an irrigation district is worth anything at all before water is obtained, after it is irrigated its value is greatly increased and the bonds become doubly secured."

S. W. Welch of Cunningham, Curtiss & Welch, corner of Sansome and Sacramento streets: "I understand the bonds are secured by a first lien on the land, and that this lien is preferred to all other incumbrances. That being the case there can be no doubt but the security is ample, and when the high rate of interest they carry is taken into consideration the bonds ought to meet with a ready sale and be regarded as a first-class investment."

E. Simon of 17 Battery street: "I have had the best attorneys in the city look into the matter of the Wright irrigation law, and they have pronounced it legal in every particular. The bonds issued under this law I believe to be amply secured by the land which they cover. They are a first lien on the land and a constant lien. The land is always responsible and

is always good for the bonds, which run twenty years and pay interest at the rate of 6 per cent."

M. Samuel of the Pacific Jewelry Company, 19 Battery street: "Of course, I believe in irrigation bonds, and I believe in them to that extent that I invested in \$1500 worth of them, which makes me a holder of about \$50,000 of this collateral. I looked into the matter myself and had the best attorneys in the city do the same, with the result of being absolutely convinced as to their worth and reliability."

Charles Flammer of Samuel More & Co., 406 Sansome street: "I consider the bonds amply secured by the lands which they cover. Money invested in the bonds I think is safe. Yet I have made no thorough examination of the subject, and my opinion is not equal to that of those who have made a complete investigation, and who are acquainted with the legal aspects of the case. But what I do know of the matter leads me to think the bonds are well secured."

William Cox of the Cox Seed and Plant Company, 411 Sansome street: "I consider the irrigation bonds worthy of every confidence, and believe them to be amply secured. I see no reason why the investment should not be considered as of the best character."

R. J. Trumbull of Trumbull & Beebe, 419 Sansome street: "If the Wright Irrigation bill is legal, as I think it is; if the land covered by the bonds is valuable, as it must be, else the water would not be brought upon it; if the amount of the bonds does not exceed the value of the land they cover, then I consider the bonds a good investment and safe in every particular."

C. W. Coburn of Coburn & Tevis, 107 Front street: "As a general proposition I consider the bonds of the irrigation district a good investment. They are well secured, yield a good interest, are a lien upon the land, and in short are as good property in the shape of bonds as a man can hold. Besides that, they benefit the State in that their sale supplies the means of irrigating large bodies of land which immediately begin to increase their products and enhance in value."

C. E. Whitney or **C. E. Whitney & Co.**, 101 California street: "I think the bonds rest on a good business basis, and will prove a good investment. Of course it is possible for a district to issue bonds illegally, or beyond the value of the land for which they are issued. Therefore, I say that an investor should exercise in his purchase of bonds the same degree of business caution that he would in any other business enterprise. Let the investor be sure that he has the best, and then he may conclude that his bonds are the equal in value and security to those issued by any corporation in the State."

F. W. Van Sicklen of Dodge, Sweeney & Co., 114 Market street: "I have heard and read a good deal about irrigation bonds, and I am convinced they are a good thing—as good, in fact, as can be found almost anywhere in the shape of an investment. When issued they are secured by a first lien on the land, which in point of value at the time is more than the amount of the bonds. This is ample security in itself. But the minute the

money obtained by the sale of the bonds is expended in securing water on the land, then the value of the land is greatly enhanced and the bonds are rendered doubly secure."

Philip S. Teller of Norton, Teller & Co., 24 California street: "I have traveled in all portions of the State and know, from what I have seen and heard, how much the Wright irrigation law is doing and will do for California. Bonds issued by the irrigationists I believe to be perfectly good, equal, so far as security is concerned, to any ever issued in the State. They bring a good interest, and I believe will rapidly grow in favor."

S. J. Friedlander, of S. J. Friedlander & Co., 21 Sansome street: "I consider the bonds to be as good security as a man seeking an investment would want. The bonds are well secured by the lands on which they are issued. I understand they are a first lien on the land, and are ahead of mortgages in case of a default of payment. They pay a good rate of interest and run a long time. What more could a man ask for?"

L. Weil, of Greenebaum, Weil & Michels, 17 Sansome street: "Of course I consider the bonds issued under the provisions of the Wright act to be good. Why shouldn't they be good? The bonds pay 6 per cent interest and are a first lien on the land; they are ahead of mortgages and of every other incumbrance. The man who wouldn't accept that as a security would not trust the United States for a two-bit piece."

Albert A. Son of Son Brothers, 13 Sansome street: "I consider the bonds to be a sure investment. I do not see how any one can question the security. They are amply secured by the provisions of the Wright bill, which the Supreme Court of this State in four decisions has pronounced valid and constitutional. The bonds pay a good rate of interest, and are secured by a first lien on the land. That ought to make them perfectly secure."

Henry Kahn of Kahn Brothers, Bine & Co., 32 Sansome street: "I believe the irrigation bonds are secure, and I believe it to be the duty of the business men of this to city further the interests of the irrigation districts. We lack, enterprise, push, vim and the characteristic of pulling together for the good of all. These bonds are a sure investment, and by means of them thousands of acres of unproductive land in this State can become productive and can support a greatly increased population."

Max Levy of Jules Levy & Brothers, 5 Sansome street: "If there is one enterprise more than another that ought to be furthered by the business men of the State it is that of the irrigationists, who are doing more to enhance the value of real estate and increase our business than any other class of men. The best way to secure irrigation is by the formation of irrigation districts, which districts issue bonds that are amply secured by the land on which they are issued. These bonds I believe to be a first-class investment and worthy of the attention of capitalists generally."

T. C. Friedlander, secretary of the San Francisco Produce Exchange: "I am heartily in favor of the bonds. There is no

question at all as to the value of irrigation in California. The Wright bill furnishes landholders the means of obtaining water for irrigation purposes in the best way for themselves, and in return also the bill furnishes investors a sure market for their money in the shape of the bonds issued by districts formed under its provisions. If these districts are organized according to law, if the land lies in such shape that water can be run all over it and if the land is of such a nature that irrigation increases its productive qualities, and furthermore if the value of the land is greater than the amount of bonds issued, then there can be no question but these bonds are as sure an investment as can be offered."

Thomas Price, assayer, of 524 Sacramento street: "I am greatly interested in the success of the Wright bill and in irrigation generally. As a rule, I believe water can be put upon land in the cheapest way by the inhabitants of the district forming themselves into an irrigating district under the provisions of the Wright law, and issuing bonds for the amount necessary to secure proper irrigation facilities. These bonds are a first lien on the land, pay 6 per cent interest, and to my mind are a perfectly secure investment—in fact, they are as secure as any investment can be, as the land before irrigating is worth more than the amount of the bonds issued, and its value keeps steadily increasing after water has been applied."

J. A. Folger of J. A. Folger & Co.: "I consider the security of the bonds issued under the Wright Irrigation law as ample. The bonds should meet with a ready sale, as they run twenty years, bear 6 per cent interest, which is paid semi-annually, and are in favor with local capitalists and business men."

Louis A. Garnett, capitalist, 35 Essex street: "I cannot say that I have made a thorough examination of the irrigation land question, but I am satisfied that if all the conditions are fulfilled the bonds are a first-class investment. If a district is organized strictly according to law, if the bonds are correctly issued, if the land lies in a way to make irrigation possible, if the land is good and of such a nature that its productiveness is increased by irrigation, if the amount of the bonds does not exceed the value of the land, then I should conclude that an investment in the bonds of that district was a good investment, and that the security offered was ample."

THE BANKERS.

They Express Great Confidence in the Bonds.

The following interviews with and letters from the officials of the leading banking institutions of the State prove most conclusively how high is the estimation in which they hold the irrigation bonds. The bankers whose individual opinions are here given are not confined to localities whose present prosperity is due to the direct effects of irrigation, but belong as well to places where irrigation is yet comparatively untried. The bankers of San Francisco are particularly outspoken in

their favorable opinion of the bonds. All concur in the conclusion that where an irrigating district has been organized according to the provisions of the Wright bill, when the bonds have been legally issued, and when the value of the land exceeds the amount of the bonds issued, then there can be no question but the bonds are a secure investment, and are worthy of the confidence of any intending purchaser.

Thomas Brown, cashier of the Bank of California: "No man could be more heartily in favor of irrigation and means to secure it than myself. I believe that the prosperity of the State depends upon it. As to whether or no irrigation is best secured by means of the provisions of the Wright bill is a question which is now undergoing considerable discussion. Bonds are issued under this bill, and the validity of these bonds depends upon three conditions: First—Is the Wright bill constitutional? Second—Can all the land in the district be irrigated? Third—Is the amount of the bonds to a sufficient degree less than the value of the land included within the district? If these three questions can all be answered in the affirmative by any district, then the bonds of that district ought to be perfectly good and well secured. Personally I have the greatest faith in the bonds of several districts which have already been tested in the courts, and the land of which is far in excess of the amount of bonds issued against it. I consider the bonds as first-class in every respect, and see no reason why they should not become popular among men who desire to make long loans at a good rate per cent."

P. N. Lillenthal, cashier of the Anglo-California Bank: "I have examined with considerable care into the merits of the Wright bill, and also of the bonds issued under that bill. I am greatly in favor of the bonds and think they are a secure and safe investment. There is no reason to doubt the legality of a district organized under the provisions of the Wright bill, and if the bonds are issued legally and the land in the district is valuable and can be made more so by irrigation, then I see no reason for doubting the bonds as an investment. In fact I think the bonds ought to receive the greatest encouragement from our business men generally, as by them are afforded the means of irrigating hundreds of thousands of acres of good land in California, which irrigation will result in increasing the population and productions of the State. That means more activity in all business centers. My ideas are embodied in a letter written on May 19th to the Produce Exchange of San Francisco. The letter is as follows:

SAN FRANCISCO, May 19, 1891.—Gerry Baldwin, Esq., president San Francisco Produce Exchange.—DEAR SIR: An unexpected call elsewhere prevented my attending the meeting called for this afternoon to consider the matter of "district irrigation bonds," and I take the liberty of sending you this communication as an expression of our views.

Up to the present time there has been no mutual understanding among local banks and bankers as to the placing of these securities under discussion, and if your deliberations result in formulating some plan of harmonious action on the part of all concerned it will go

inward starting these securities on a healthy basis and giving them a standing among smaller investors here and abroad.

In the first place, the fact that a Supreme Court decision appears to be necessary in each particular case leads the uninitiated to believe that there is some defect in the law requiring legislative remedy, and until such time as one decision will suffice for all districts certain bonds are sure to be unfavorably affected and ultimately reflect on the negotiation of all bonds of this character.

This difficulty overcome, it would add to the confidence of intending investors if a State board of control—whose manner of election could be of a nature to divest it of every possible political taint—were organized, with full powers to decide within the law the numerous and various differences existing among the residents of any particular district. Their power would practically make them a general court of arbitration, and when upon proper application, in their opinion, districts should be organized and bonds issued, the mere fact of their recommendation, together with the knowledge of their constitutionality, would make them a favored form of investment and facilitate the general development of such sections of our State as require irrigation of this sort.

Under the foregoing conditions we believe not only the savings banks of this city who are enlarging the scope of their outstandings would come in as free loaners on, if not purchasers of, this class of securities, but the commercial banks would assist in the placing of these bonds with Eastern and foreign investors, who are only waiting for such indorsement as we could give them to freely put their funds into them. Yours sincerely,

P. N. LLEWENTHAL

Daniel Meyer, banker at 212 Pine street: "To the question, what I think of irrigation bonds, the best reply I can make is that I am a holder of the bonds of these irrigation districts to quite a large extent. I consider the security ample, as the bonds are a first lien on the land, and the value of this land increases in proportion to the degree it is irrigated and cultivated. If land is worth as much or more than the amount of the bonds before irrigation is obtained, then the bonds are certainly good; but after irrigation the security of the bonds is still further enhanced by the increase in the value of the land. The bonds have been sold largely here in San Francisco, and they would meet with a readier sale if our large capitalists would be content with 6 per cent interest. But they want more, and consequently do not invest very largely in irrigation bonds. The bonds are issued under the Wright act, which has been pronounced valid by our highest courts. If a district is organized according to all the requirements of this act, if the bonds are legally issued, and if the amount of the bonds does not exceed the value of the land, then I cannot see how the bonds could in any way be insecure, or how they could fail to commend themselves to the attention of our capitalists as soon as they became acquainted with and recognized the merits of the bonds, and the laws and safeguards by which they are surrounded. I am glad Eastern and foreign capitalists are beginning to make inquiries concerning the bonds and to invest in them. The time is not far distant when the bonds of these districts will rise to a par value and even beyond it, and will be sought after as among the most desirable bonds to be obtained anywhere."

H. Wadsworth, treasurer of Wells, Fargo & Co's Bank: "I cannot say

that I have given the matter of irrigation bonds issued by the several districts the careful attention that the importance of the case demands. But I know that the Supreme Court has tested the matter in several important cases, and that in every instance the bonds have stood the legal test. This fact, in connection with the fact that the bonds are a first lien on the land, ought to stamp them as being perfectly secure; as secure as any other bonds now on the market. The interest paid is 6 per cent, which ought to be satisfactory."

W. F. Goad, attorney-at-law and director of Wells, Fargo & Co's Bank: "I am heartily in favor of irrigation and irrigation bonds. I have been a resident of this State for many years and I realize how great a benefit water is to a thirsty soil. Irrigation more than doubles the productive power of the land. It is good not only for the growth of orchards and vineyards, but also can be used most advantageously for cereals, alfalfa and the like. Irrigation can be secured either by private capital or by the formation of irrigation districts. The former method, however, as a rule is more costly to the farmer than if he owned a share in an irrigating system, such as is practically the case in districts formed under the Wright act. I have had considerable to do with these districts and have been associated with the leading attorneys of this city in the endeavor to oppose the formation of certain districts, and to prove the illegality and unconstitutionality of the Wright bill. These legal contests have been very thorough and hard fought, and have gone over the ground from the time the first petition of the irrigationists was brought forward to the time the bonds were issued. We tried hard to find a flaw, but were unable to do so. As a result I came to the conclusion the bonds were as good an investment as could be desired—so good, in fact, that I purchased at one time bonds to the amount of \$100,000, and at another to the amount of \$60,000. That is evidence that I have faith in the bonds and believe that they are safe and are amply secured."

F. G. Murphy, president of First National Bank: "It would be difficult to find in the State a more enthusiastic believer than myself in the benefits resulting from irrigation. Abundance of water means abundance of crops, of money, of population. Scarcity of water means uncertainty of crops, little money and a scattered population. The best method of obtaining water for irrigation purposes seems to be through the provisions of the Wright bill, which has been pronounced constitutional by the best legal authorities in the State. As to the bonds issued under the provisions of the Wright bill, if a district has conformed to all the legal requirements of the bill in the various steps of its organization, if the bonds have been issued in conformity to law, and if the value of the land is a proper equivalent to the amount of the bonds issued, then the bonds ought to be good as an investment, and ought to meet with a ready sale."

Eugene Meyer, manager of the London, Paris and American Bank: "I consider irrigation bonds to be good, from a financial standpoint. Take for example

an irrigation district that the courts have decided to be legally organized, in conformity to the Wright bill, whose bonds are less than the value of the land and have been legally issued. These bonds are a first lien on the land, and as such ought to be amply secured. I should consider such bonds to be a safe investment, and I think they will grow rapidly into public favor. The security is increased in proportion to the amount of water that is introduced into the district for irrigation purposes, and in proportion to the consequent increased productiveness of the land."

James S. Hutchinson, manager of the Sather Banking Company: "In regard to the irrigation bonds which are attracting such increased attention lately, I think the bonds ought not to be passed upon or considered as a whole, but that the bonds of each district should be examined apart from all other districts, and that the worth of the bonds of any one district depends upon whether or not said district in its organization and issuance of bonds has complied with all legal requirements, and whether the value of the land in the district is equal to or in excess of the amount of the bonds, which are a first lien upon the land. If a district can stand these legal and financial tests then its bonds ought to be as good as any bonds that can be placed upon the market."

Gustav Sütro of Sütro & Co., bankers, 408 Montgomery street: "I consider irrigation bonds good. They have been tested in the Supreme Court and have been pronounced legal—at least some of them have. They are issued by districts which have certain legal requirements to comply with, and when this has been done, and when a due proportion exists between the amount of the bonds and the value of the land, then I see no reason for doubting in the least the security of the bonds."

J. F. Bigelow, vice-president of the Nevada Bank: "Irrigation bonds are similar to other bonds, such, for example, as bonds issued by our various local street car and cable corporations. Some of these bonds rank higher than others and are in greater demand as an investment. So it is of the bonds of the various irrigation districts. When the bonds of any district have been passed upon favorably by competent attorneys, when engineers say the system of irrigation is all that is required, when experienced appraisers pronounce the value of the land to be far in excess of that of the bonds, then it is safe to say there is no reason for distrusting the bonds, and the security seems to be ample."

A. K. Cravath, a prominent banker at Escondido, Cal.: "The Wright Irrigation bill is doing a vast amount of good for California, and the benefits resulting from it will be constantly increasing. By means of this bill capitalists are induced to invest their money in enterprises which develop the State, and which transform barren fields and deserts into orchards, waving fields of grain and veritable garden spots. Everywhere in Southern California you see evidences of this. The money thus invested is not only a benefit to the locality where it is expended, but also yields a good return in interest to the investor, who

is perfectly secured by the land covered by the bonds, which are a first lien on the land. This land is constantly increasing in productiveness and also in population, which facts increase the security of the bonds. As a banker in a district where irrigation is practiced extensively I have no hesitation in stating the bonds in my opinion are perfectly secured."

N. D. Rideout, president of the London and San Francisco Bank: "As a banker I feel somewhat delicate in expressing an opinion as to the value of securities. I am inclined, however, very favorably toward the irrigation bonds, and believe that generally they rest on a sound financial basis. In investing in irrigation bonds the intending purchaser should use the same methods he employs in all other investments, such as real estate, for example. Because some real estate investments are good it does not naturally follow that all are equally good. So with irrigation bonds. There are three conditions which must be fulfilled in order that irrigation bonds be above question. First, the Wright law must (as I think it is) be constitutional; second, the organization of the irrigation district must be legally effected, and all conditions complied with; third, the value of the land must be sufficient to cover the amount of the bonds issued. These three conditions being fulfilled, there is no reason why the bonds are not amply secured, and are not on a par with bonds that are now in great demand among investors."

F. P. Morrison, president First National Bank of Redlands: "I consider irrigation bonds a good and safe investment when they meet the requirements of the Wright law as to organization of the district and issuance of the bonds, which would include the confirmation proceedings under the act of 1889, and when the land is ample security for the amount to be bonded. The ability to meet interest promptly should be considered. The courts have declared the machinery good, and the above tests are only those that are applied to bonds in general. Irrigation is now a most important factor in quickening the development and growth of California, and, consequently, the interests of its bankers and capitalists. They, therefore, should give these bonds every encouragement in their power where the conditions above referred to are satisfied."

O. McHenry, president First National Bank of Modesto: "I have examined the Wright Irrigation law, and am familiar with the issuance of bonds under it, together with the great enhancement of values of land provided with irrigation facilities. I am of the opinion that when the terms of said law are properly complied with such bonds form one of the very best securities for permanent investment. There is absolute security for the payment of interest and for the redemption of the bonds when they shall have reached maturity, and I recommend them to all seeking long-term investments for trust and other funds."

E. C. Dyer, cashier Riverside Banking Company: "We consider 'irrigation bonds,' issued under the 'Wright act,' and in strict compliance with the irrigation laws of the State, a good and safe investment, but would recommend to investors thorough investigation in regard to the

value and quality of lands they were to cover, as well as the means of obtaining an ample supply of water. In districts where these conditions are favorable the bonds cannot be otherwise than a good investment, and we know of no better security."

A. L. Cressey, president Modesto Bank: "I have examined the Wright irrigation law and am familiar with the method of the issuance of bonds under it, together with the great enhancement of values of land provided with irrigation facilities. I am of the opinion that when the terms of the law are properly complied with such bonds form one of the very best securities for permanent investment. There is absolute security for the payment of interest and for the redemption of the bonds when they shall have reached maturity, and we recommend them to all seeking long-term investments for trust and other funds."

A. H. Naftzger, president First National Bank of Riverside: "In reply to your request for our views regarding irrigation district bonds issued under the provisions of the Wright act, I beg to say that we consider these bonds very desirable to those wishing to make investments not to be disturbed for a long term of years. Usually such bonds are issued covering lands nearly or quite without improvements. This being the case it follows that if the land be capable of development and the water supply undoubted the margin of security for the bonds must rapidly and greatly increase. Care should be exercised touching the legality of the issue, quality of land, supply of water, in short, the same care and scrutiny that a conservative investor would bring to the investigation of any other class of securities. In these particulars each district must make its own showing. I might say that we know more about the East Riverside Irrigation District than any other, it being near us. The land in this district is of a superior quality, location the best, and with the other conditions properly met, we can unhesitatingly recommend these bonds as amply secured."

W. F. Baird, vice-president Bank of Madera: "I have examined the Wright irrigation law and am familiar with the method of the issuance of bonds under it, together with the great enhancement of values of lands provided with irrigation facilities. I am of the opinion that, when the terms of that law are properly complied with, such bonds form one of the very best securities for permanent investment. There is absolute security for the payment of interest and for the redemption of the bonds when they shall have reached maturity, and I recommend them to all seeking long term investments for trust and other funds."

J. A. Strout, president Bank of Selma: "I have examined the Wright irrigation law and am familiar with the method of the issuance of bonds under it, together with the great enhancement of values of lands provided with irrigation facilities. I am of the opinion that when the terms of that law are properly complied with such bonds form one of the very best securities for permanent investment. There is an absolute security for the payment

of interest and for the redemption of the bonds when they shall have reached maturity, and I recommend them to all seeking long-term investments for trust and other funds."

E. Lathrop, president of the Bank of Tulare: "I have examined the Wright irrigation law and am familiar with the method of the issuance of bonds under it, together with the great enhancement of values of lands provided with irrigation facilities. I am of the opinion that, when the terms of that law are properly complied with, such bonds form one of the very best securities for permanent investment. There is an absolute security for the payment of interest and for the redemption of the bonds when they shall have reached maturity, and I recommend them to all seeking long-term investments for trust and other funds."

D. W. Madden, president Tulare County Bank: "I have examined the Wright irrigation law, and am familiar with the method of the issuance of bonds under it, together with the great enhancement of values of lands provided with irrigation facilities. I am of the opinion that when the terms of that law are properly complied with such bonds are of the very best securities for permanent investment. There is absolute security for the payment of interest and for the redemption of the bonds when they shall have reached maturity, and we recommend them to all seeking long-term investments for trust and other funds."

Following are extracts from letters written at the request of **L. M. Holt**, editor of the *Alessandro Orange Belt*, who has taken an active interest in promoting public education upon the desirability of irrigation bonds as an investment:

Ed R. Hamilton, cashier of Sacramento Bank, Sacramento, Cal.: "When the water supply is amply sufficient, and the law has been strictly complied with, and the value of the property in the district is sufficient to make the bonds good, we consider said irrigation bonds a fine investment, as the security will be gradually increasing in value for many years to come."

A. Montpelier, cashier and manager of Grangers' Bank, San Francisco: "We would say that, the legality of irrigation bonds once established, their value depends mainly upon the manner in which the undertaking is carried out; that is, upon the relation the amount expended bears to the results accomplished. Where this is satisfactory the bonds cannot be otherwise than a good investment."

Lovell White, cashier of the San Francisco Savings Union: "We think that some few of the districts of the State are speculative in character, organized by persons oversanguine of results, and that there are others where lack of water or difficulty of distribution will forbid success. Discriminating against objectionable districts we believe that "irrigation bonds," so called, constitute desirable investments and are a safe security for loans by moneyed men and institutions. So soon as irrigation bonds of any particular district can be said to be readily saleable in the market they will, with us,

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complete with other securities when we have money to invest or to loan."

E. J. Le Breton, president of the French Savings and Loan Society, San Francisco: "I am in a measure familiar with the Wright act and the issuance of irrigation district bonds under it. As a principle I see no good reason why such bonds should not be a good investment, provided the law has been strictly complied with, and provided the bonds issued represent a conservative fractional proportion of the value of the lands securing them. What the percentage of the proportion should be would depend on many circumstances, and it would hardly be prudent to lay down a fixed ratio. The business ability and integrity of the commissioners are elements to be considered. Savings banks, when they buy bonds have always to consider the readiness with which their holdings can be converted into cash. Until irrigation district bonds are generally known and introduced, and as a result find ready sale, I would hardly consider them a desirable investment for savings institutions; they are a new class of securities, and can hardly be expected to sell on a 6 per cent basis."

William E. McConnell of the Santa Rosa Bank: "Sonoma county lands do not require irrigation, hence we have had little to do with the irrigation law and have had no occasion to investigate the matter, and are not sufficiently posted to give an opinion. The lands in the irrigation district I know to be valuable, and when reclaimed will, in my judgment, be first-class security for the bonds."

J. E. Ward, cashier of the First National Bank of Modesto, Cal.: "We consider irrigation bonds a good investment."

A. C. Henry, California Bank and Trust Company, Oakland, Cal.: "Generally speaking I would consider irrigation bonds to be perfectly good, but before purchasing any particular bond I would carefully investigate the proceedings in its issuance."

A. L. Lincoln, cashier First National Bank of Santa Barbara: "It appears from the report on the subject of a committee of the Chamber of Commerce that if the districts are properly organized and all proceedings technically correct, the bonds afford the very best security for investments."

J. A. Green, President State Bank of San Jacinto: "In relation to the value of irrigation bonds will say that since the courts have settled the legal status of the bonds there can be no further question except of security. I have given the matter considerable attention, and in my judgment the security is good, from the fact that the issue of bonds usually does not exceed the value of dry lands, which is low compared to well watered lands that enable owners to raise the more valuable fruits and alfalfa."

Frank C. Bolt, vice-president of San Gabriel Valley Bank, Pasadena: "I think, when legally issued, the irrigation bonds first-class security."

Norman Rideout, vice-president of Rideout Bank, Marysville, Cal.: "Local capitalists have not up to the present time shown any great eagerness to take these bonds, and those that have been

sold have mostly gone to foreign investors, but now that the Supreme Court has sustained the Wright law and attention is being drawn to the value of these bonds I am satisfied that they are going to be more sought for by investors in this State. It seems to me that where the value of the lands in the district is ample and the proceedings and organization correct, the character of the bonds should be beyond question. Irrigation bonds in the next year are going to have better value, and it is safe to say that bonds of good districts purchased at any price from 90 to 95 cents will prove profitable investments."

R. B. Murdock, director and cashier Bank of Orland: "The lands in the Kratt and Orland Southside Irrigation districts are good security for the amounts for which they are offered as security. When the water is placed on these lands they will no doubt double in value in one year's time."

W. D. Woolwine, cashier of the First National Bank of San Diego: "Believing, as I do, that water is a prime factor in the value and utility of California land, and knowing that with good land (of which there is an abundance) and ample water, well directed effort in the cultivation of the soil is sure of profitable return, it is my opinion that irrigation bonds are sure to prove both a safe and a profitable investment. This, of course, presupposes that the investor will look to the details of the issuance of the bonds, the quality and quantity of the land to be irrigated, and the abundance and permanence of the water supply."

REAL ESTATE DEALERS.

They Speak Highly of Irrigation Bonds.

San Francisco real estate dealers are counted as the most shrewd and farsighted men in the State when it comes to placing values on land or making investments which are secured by land, either in city or country. The leading firms in this city have been interviewed in regard to their opinions of the value of irrigation bonds, and they concur in the most emphatic expressions of confidence as to the security of these investments. They say that the floating of the bonds means increased irrigation; that will result in increasing the value and productiveness of California land all over the State. This in turn will result in increasing the business and prosperity of all our towns and cities.

Wendell Easton of Easton, Eldridge & Co., 618 Market street: "I consider the irrigation bonds as 'gilt edged.' No better security was ever offered as an investment in this or any other State. I own land in the interior, situated in several irrigation districts, and I know from personal experience and observation how much these irrigation districts have added to the value of the land they include. This is proof positive that the security of the land is good. If more proof is desired, then all that is necessary is to remember that the bonds are a first lien on the land, and that the highest tribunals in this State have pronounced the

Wright bill constitutional, and these bonds issued under its provisions are legally issued and the security offered is unassailable."

M. W. Bell of the N. C. Carnall Company, 624 Market street: "I can say without reserve that I believe the bonds issued by the irrigating districts in the State are as good as are the bonds of the Spring Valley Water Company or the San Francisco Gas Company, or any other first-class security. I suppose no one will question the strength or solidity of these companies or the value of their stock. Yet it seems to me that the bonds of these irrigating companies are just as secure and will soon come into just as great demand."

C. H. Street of 319 Pine street: "As a real estate agent, dealing chiefly in country lands, my experience has been that these irrigation bonds are perfectly secure. They add immeasurably to the value of the land on which they are issued, and thus add to their own security. They are legal, are indorsed by the best business men of the city and State, and are rapidly growing in favor with capitalists. I see no reason why they should not rank equal with and superior to other investments which are now regarded as in the lead, such as real estate mortgages, for example."

W. C. McAfee, of McAfee, Baldwin & Hammond, 10 Montgomery street: "Concerning the bonds issued under the provisions of the Wright bill, I can only say on general principles that I believe in irrigation for this State, and I know that water greatly enhances the value of the land on which it is brought. If this land is the security of the bonds by means of which the water is obtained, then the security must be ample and the bonds must be good. But this is a legal matter and one for the courts to determine. I understand, however, that the matter has been tested several times in the Supreme Court, and that in every instance the irrigationists have won and the bonds are pronounced valid. This seems to put the bonds above question as a desirable investment."

G. H. Umsen, 14 Montgomery street: "I have looked into the matter as to the validity of the bonds issued by some of the irrigation districts and feel confident the bonds are legal, solid and are amply secured. They are a new thing, however, and the public and the capitalists have to be educated a little in regard to them and in regard to the importance and validity of the Wright law under which they are issued. I believe them to be as sound as Government bonds and that before long they will rank on a par with them and be more sought after because they pay a higher rate of interest."

William H. Bovee, of Bovee, Toy & Co., 19 Montgomery street: "I am glad the San Francisco Chamber of Commerce, by their committee, recently placed the stamp of their approval and confidence on the bonds issued by the irrigation districts. I believe that men who have money to loan and who want a safe investment can do no better than to purchase the bonds. The security, to my mind, is unquestionable. I do not see where there can possibly be a failure as

to the payment of the bonds, both principal and interest."

J. J. O'Farrell of O'Farrell & Lang, 11 Montgomery street: "You ask me what I think of the bonds issued under the Wright Irrigation act. I consider them as good, so far as being secured is concerned, as are United States Government bonds. 'Why?' Because the irrigation bonds are secured by the land on which they are issued, and because they bear 6 per cent interest, which is higher than the interest paid by Government bonds. If a district is organized according to the provisions of the Wright bill, if the bonds are issued legally, if the land is such that it can be irrigated and will increase in productiveness thereby, I can see no reason on earth for doubting the worth or the security of the bonds."

Cyrus F. Lathrop of the N. C. Carnall Company: "For three years I was actively connected with irrigating enterprises, and became thoroughly convinced as to the legality and practicability of the Wright Irrigation law, and the security of the bonds issued under its provisions. I consider the bonds a perfectly safe investment, as they are secured by the lands on which they are a first lien, and as this land constantly increases in value. I have no hesitancy in expressing my utmost confidence in the bonds, and think there is no doubt but that the districts against which the bonds are held will be able to pay the principal and interest in full without delay or difficulty."

S. P. Middleton, 22 Montgomery street: "As I understand these bonds they are secured by land worth as much as, and, in many cases, much more than the bonds. There can be no question as to the value of California land, and if this land lies so that it can be irrigated, and if an abundance of water can be obtained for irrigation purposes, then its value ought to be greater than that of any other farming land in America. That seems to me to be a simple argument, and yet it proves conclusively that irrigation bonds, legally issued, secured as they are by a first lien on land, are as safe an investment as can be found in America. I regard them as secure an investment as that offered by any class of bonds that can be named. Our San Francisco capitalists are but just beginning to realize their value."

W. E. Fisher of Tevis & Fisher, No. 14 Post street: "There is no question in my mind as to the worth of bonds issued by the irrigation districts of the State. We own land in the San Joaquin plains that with plenty of rainfall will raise an abundant crop; what we want is a surety of abundant moisture, and that is only secured by irrigation. As a consequence we are heartily in favor of the method of irrigation to be secured by the provisions of the Wright bill. That bill has been pronounced constitutional by the highest courts in the State. The bonds issued under the bill are secured by a first lien on the land, which means that the bonds are to be preferred to a first mortgage even. As the land in California which is susceptible to irrigation is all valuable and is rendered twice as valuable by irrigation, I do not see how there can be any doubt but the bonds are well secured and as safe

investments as can be found in the State."

Henry Stern of Stern & Carr, 323 Montgomery street: "As I understand it, the Wright bill provides for irrigating land by the issuance of bonds, which are secured by a first lien on the land. The sale of these bonds provides the means for the completion of an irrigating system. As the courts have decided in several cases that the Wright bill is legal, then if the bonds are issued properly and the land is at all valuable, I see no reason why the bonds are not amply secured and why they should not be regarded as an excellent investment."

W. W. Boughton, treasurer of the A. R. Briggs Company: "So far as we understand it, the proposition of selling bonds issued by the irrigation districts is a good one. In the first place the bonds are well secured and are sold on a good business basis. In the next place there are thousands of acres of land in this State that would double in value the minute water is obtained for irrigating purposes. This, of course, adds to the worth of the securities of the bonds. Irrigation bonds can be examined as to their legality by competent lawyers just as other bonds are examined and passed upon, and when the issuance of the bonds has been determined legal, and when the bonds are less in amount than the value of the land, then I can see no reason in the world why the bonds ought not to come into great demand with capitalists."

M. J. Burke of Madison & Burke, 402 Montgomery street: "I am a firm believer in the ultimate great prosperity and wealth of this State as accomplished by irrigation, and I believe the Wright bill, as illustrated and exemplified by the many districts organized under its provisions, will be, and is, a great factor in accomplishing this result. I have made quite a thorough study of the bonds issued under the Wright law, and I believe they are well secured and offer great inducements for the investment of large amounts of capital."

F. M. Pickering, secretary of Howard and Wilson Colony Company: "Probably no one is a stronger advocate of irrigation than myself. The land where our colony is situated would be of little value without it. But with water the same land has proved to be of great fertility. As to irrigation districts formed under the Wright law, if these districts are wisely and legally organized they are undoubtedly desirable institutions. Some that I know of are worthy of all confidence. But judgment must be exercised in their formation. They must not be too large, the cost of the irrigation system adopted must not be too great; in fact, the same principles of caution and wisdom enter into the formation of these irrigating districts as into all other corporations."

M. J. Mertens of Joost, Mertens & Co.: "I think irrigation bonds a good investment. The law states very plainly what steps are to be taken in order to make the formation of the district legal, and in order to make the issuance of the bonds valid. If these steps are taken just as the law directs, and if the land is of such a character as to be benefited by irrigation, I can see no reason why irrigation

bonds do not present a first-class opportunity for investment."

INSURANCE MEN.

Irrigation Bonds Highly Favored by Them.

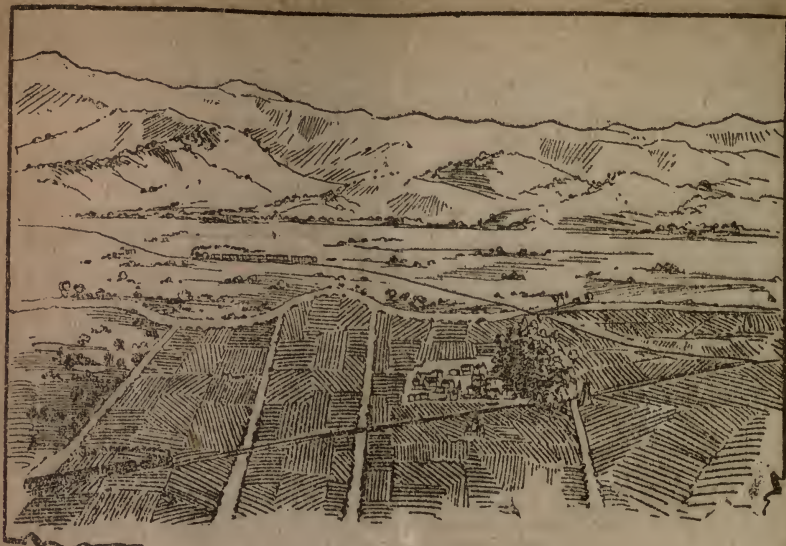
Following are the opinions of many of the leading fire and life insurance agents. It is a large share of the business of these gentlemen to examine carefully the merits of various business propositions and to pass favorably or otherwise upon them. Many of these agents have examined the bonds of some of the irrigation districts, and the more they look into the manner of the issuance of these bonds and the worth of their securities the more do they become convinced that the opportunities thus offered for investments are exceptionally good.

George C. Boardman, general agent of *Edna Fire Insurance Company*: "I have not given the matter of these irrigation bonds the thorough examination that some have, but I understand our highest courts have passed judgment in their favor and that the bonds rest on legal ground. Taking that fact into consideration, together with the fact that the bonds are secured by a first lien on the land, which with irrigation and cultivation is constantly becoming more valuable, I do not see what more is needed to make the security good and the bonds a favorite with investors."

D. J. Staples, president of the *Fireman's Fund Insurance Company*: "No man need tell me anything as to the value of irrigation for California. I have been here many years and have seen what was thought would always remain a desert become a productive plain solely through irrigation. One of the best means of obtaining water for irrigating purposes is by the provisions of the Wright bill, which enables small and large farmers to obtain water at equal rates and at profitable cost. The bonds issued by irrigation districts are undoubtedly valid if the terms of the law are complied with, and when they come into good demand with capitalists will be held by many of our leading insurance companies."

A. B. Forbes, general agent of the *Mutual Life Insurance Company of New York*: "As to whether or no irrigation bonds are good, it depends on certain conditions being fulfilled. In the first place the land must be situated in a portion of the State where irrigation is needed and where the lay of the land permits water to be run over it. In the second place the land must be of such a nature that irrigation benefits the land and produces better and larger crops than could be produced without it. Then again, the bonds must be issued legally and in accordance with certain well-defined provisions, as laid down in the Wright bill. These conditions being fulfilled, I see no reason but that the bonds are well secured and will meet with a ready sale."

James Munsell Jr., general agent of the *Mutual Benefit Life Insurance Company of New Jersey*: "Every State has the right to legislate for itself. Our Legislature enacted the Wright Irrigation



Scenes in the Kern and Tulare district.

law, and this law, enacted as it was, has stood and will stand all legal tests. This act makes the bonds issued under it a first lien on the property of the district. This makes the bonds secure as a first-class business investment."

Butler Burris, cashier of Manhattan Life Insurance Company: "I consider irrigation bonds to be a good investment. What this State needs most of all is water, and farmers and fruit-growers are willing to pay for it, and offer their land as security for the money that pays for the water. I do not see any objection that can possibly be urged against the bonds if they are legally issued, and the land is good on which the water is brought."

E. A. Waltz, manager of the Equitable Life Insurance Company: "My business takes me all over the State, and I know the value of irrigation and the worth of irrigation bonds. Land without water may be almost worthless, but that same land irrigated may be worth a great deal, and offers good security for the bonds, the sale of which enables the owners of the land to cultivate it and raise profitable crops."

Charles D. Haven, recording secretary of Liverpool and London and Globe Insurance Company: "The security of irrigation bonds depends on whether the Wright act is constitutional, whether there is a sufficiency of water to irrigate the land of the district on which the bonds are issued, and whether the price of the water is so low that farmers can afford to use it. These conditions being favorable the bonds are well secured and ought to be a good investment."

F. L. Olmstead, cashier of Southern California Insurance Company: "I know from personal observation what irrigation has done for this State, and also how profitable any scheme can be which enables water to be brought on to land which

without it is unproductive. Irrigation bonds ought to be as secure an investment as can be found in California."

H. K. Belden of Hartford Fire Insurance Company: "I am a thorough believer in the merits of irrigation for California, and am also firmly convinced as to the value and security of irrigation bonds. Land worth \$25 an acre without irrigation is worth from \$60 to \$100 an acre as soon as water is placed upon it. This land is the security for the bonds, and the security, to my mind, is ample."

John Scott Wilson of the insurance firm of Mann & Wilson: "I believe in the security furnished by irrigation bonds. For example: Here is a tract of land comprising 150,000 acres. It lacks irrigation facilities, and yet, without water it is assessed now at \$2,500,000. It raises crops of cereals, but if it could be irrigated it could raise much more valuable products. It will cost \$750,000 to bring water onto this land, and this amount, \$750,000, is raised by forming an irrigation district and issuing bonds for that amount, and the bonds are a first lien on the land, which increases in value as soon as irrigated. In other words, \$2,500,000 worth of land is security for \$750,000 worth of bonds. That ought to be ample security."

THE CHAMBER OF COMMERCE.

A Hearty Indorsement of Irrigation Districts and Bonds.

A movement looking to the advancement of public interest in the irrigation districts of the State was inaugurated in April at a meeting of representatives of the various organizations under the Wright law. At that meeting some twenty of the most active districts were represented, and after discussion a committee was appointed to confer with the

Chamber of Commerce on the subject.

The Chamber of Commerce appointed a special committee on the subject, and to that body the irrigationists presented a statement containing a full exposition of the subject, the basis and value of the bonds, etc.

After due consideration of the matter the committee from the Chamber of Commerce, consisting of Isidor Jacobs, W. T. Y. Schenck, John F. Kennedy, S. G. Hilborn and W. L. Merry, rendered the following strong report in favor of irrigation bonds:

"Your committee respectfully report that at the conference held on the 22d inst. with the delegation above named the question of the value and sale of irrigation district bonds issued under the Wright law was fully discussed, with the following general result:

"Your committee is fully satisfied and convinced that, with the proper and customary examination by the investor or party representing him of the prior compliance with all the conditions required by law, and also of the character of the land which it is proposed to bond and the supply of water available, irrigation bonds issued under the Wright law are as good security and as safe an investment as any bonds issued under statutes. With this decision as a conclusion we respectfully recommend the adoption by the honorable board of trustees of the following resolution:

Resolved, That the trustees of the Chamber of Commerce of San Francisco, after careful investigation of the conditions connected therewith, are of the opinion that bonds issued by irrigation districts in the State of California under the Wright irrigation law are a safe investment and excellent security to investors, providing the two following conditions precedent are complied with:

First—A careful investigation as to the compliance with the requirements of the law prior to the issue of said bonds.

Second—An examination of the character of the lands on which it is proposed to issue said bonds and the facility for obtaining a water supply.

"With these qualifications, which should control all investments with real estate security, we can confidently recommend these bonds to capitalists as worthy of their confidence, both principal and interest being as secure as any investment can be made by legal enactment and intrinsic merit."

TURLOCK DISTRICT.

THE FIRST ORGANIZED UNDER THE WRIGHT LAW.

A Large Amount of Work Done in the Construction of Dams and Canals.

The Turlock district enjoys the proud distinction of having been the first one organized under the provisions of the Wright act. It has had to bear the brunt of all the experimental work incidental

to an untried system involving vast interests, but has been successful in every move, and to-day occupies a position that could scarcely be improved upon.

The petition for the organization of the Turlock district was presented to the Board of Supervisors on April 11, 1887, the same embracing about 30,000 acres of land in Merced county. The total area of the district is about 176,210 acres, the greater portion being in Stanislaus county. The Supervisors considered the petition from April 11, 1887, to April 28, 1887. No opposition worthy of note was made, except as to particular boundaries, therefore the petition was granted and an election was ordered April 23, 1887, with the slight changes necessary in the proposed boundaries. The election was ordered to be held on April 28, 1887, and the district was organized by the Board of Supervisors pursuant to the election on June 16, 1887. The directors elected were: E. V. Cogswell, R. M. Williams, E. B. Clark, W. L. Fulworth and J. P. Dunn.

The first meeting was held and organization effected on June 5, 1887, and E. B. Clark was elected president, R. M. Williams secretary and C. N. Whitmore treasurer. The only action taken was the selection of officers and some routine business transacted. Preliminary plans and estimates were ordered on June 15, 1887, and were completed and adopted September 15, 1887, George E. Manuel being the civil engineer who made the same.

The area of the Turlock district is nearly 177,000 acres. The capacity of the proposed canal is 1500 cubic feet per second. This will give one cubic foot to each 118 acres for the whole district. A comparison with other places where water is used and sold will show that these figures are more than ample. The Fresno Canal and Irrigation Company sells water rights of one cubic foot each for 160 acres. This same proportion is followed by the Crocker-Huffman canal at Merced, the "76" canal, the Kings river and Fresno canal, and in fact all canals in Fresno, Tulare and Merced counties who make a business of selling water. In Los Angeles and San Bernardino counties greater economy is practiced. The average duty of a cubic foot of water in these counties as given by the State Engineer's report is 300 acres. At Pasadena it reaches 1656 acres. In parts of Spain 200 to 400 acres. In Algiers 425 acres. In Italy somewhat less. In Italy and some of the old irrigated countries, whose works date back for centuries, it is found that on an average only from one-half to two-thirds of the lands under the canals and susceptible of irrigation from them is actually irrigated from them.

From this it seems that an allowance of one cubic foot for each 118 acres over the whole district is ample. The question may then be asked, why build the canal so large? The canal was designed of this size for the following reasons: First, the country has never been irrigated and will take a large amount of water at first; second, the quantity of the water in the river is more than ample at certain seasons and no one is injured by its diversion; third, the expense per acre is not so great but what it can be borne with ease; fourth,

part of the district is very sandy; fifth, we wish all satisfied and prefer to have too much rather than too little.

The following gaugings of the Tuolumne river, the source of supply for the district, are taken from the State Engineer's report and will show what an amount of water is available: "This is a river of the first class, having a large, high mountain drainage basin. The gaugings were made at a station near the railroad bridge south of Modesto. A scale of discharge at different stages was drawn up. A rod record was kept from 1879 to 1882 inclusive, and occasional observations made since the last date. From these data as a basis with estimates of flow per square mile of drainage area as heretofore explained the results of the table are presented as sufficiently exact for all purposes of a general water supply discussion.

	1878-79.	1879-80.	1880-81.	1881-82.	1882-83.	1883-84.	Aver.
November.	65	101	35	193	570	327	215
December.	65	968	1,095	620	620	327	556
January....	478	409	2,884	620	654	410	841
February....	1,876	625	6,755	573	490	490	1,801
March.....	2,797	332	2,879	2,164	1,310	7,540	2,754
April.....	4,456	714	4,260	3,543	3,270	7,360	5,338
May.....	5,086	10,371	7,274	7,461	3,180	7,360	7,622
June.....	7,061	14,075	5,225	8,046	6,546	3,180	8,183
July.....	1,977	7,618	1,996	3,746	1,656	5,540	3,751
August.....	183	1,233	391	574	490	1,635	751
September..	89	134	125	225	327	827	196
October....	30	66	130	873	262	245	266

These gaugings include the contributions of Dry creek, a tributary entering the river just above the point of observation. This only runs water in the rainy season. The flow of several mining ditches taken from the river in the mountains above has not been taken into consideration. For very low periods this would materially affect the results. Some of this water finds its way back into the river.

From these figures it will be seen that the supply of water is more than sufficient during the spring and summer months, when irrigation is most needed. Should more water be desired during the autumn months it can be supplied by reservoirs in the mountains. During this season of the year very little irrigation is done, and so the demand will not be great. The engineer stated that he was informed that there are several lakes and natural reservoirs in the mountains that can be made available at slight expense.

The engineer's estimate of cost, as rendered, was \$467,544 62, and his preliminary plans were adopted September 16, 1887. An election for bonds was ordered on September 16, 1887, the value of the bonds proposed to be issued being \$600,000. The election was held October 8, 1887. The number of votes cast by sub-districts for and against was as follows:

	Aye.	No.
District No. 1.....	17	0
District No. 2.....	36	2
District No. 3.....	47	5
District No. 4.....	70	4
District No. 5.....	6	1

Total.....176 12

Thereupon the bonds were ordered is-

sued and there was no opposition thereto. Bonds to the full amount were issued October 10, 1887, and were advertised November 7, 1887. To date (June 5) \$422,500 worth of bonds have been sold, a large amount going to residents in the district.

Final plans and estimates of work were ordered during October, 1889, George Manuel, C. E., offering to make them at a stated salary, and the work was assigned to him. The plans and estimates were made at a cost of about \$2000, the same being presented and accepted during December, 1889.

Contracts were advertised for the construction of about five miles of the upper works and bids were received on January 7, 1890. The remainder of the canal has been cross-sectioned and specifications prepared. The construction was commenced on February 10, 1890, by Contractor Grey under the contract system. The financial status of the district is good, and money received from the sale of bonds has been \$279,000 and from taxes \$35 337, and the amount of money expended was \$33,000 for salary of officers and general expenses, attorneys' fees, right of way, etc.

The assessments levied are as follows: In 1888 42½ cents on \$100 and in 1889 70 cents on \$100. These amounts were levied on September 18, 1888, and on October 15, 1889. The amount collected was \$32,000, with very little opposition.

The lawsuits in connection with this district were one to determine the constitutionality of the law and two suits for condemnation of right of way, the nature of the suits being as follows:

Turlock Irrigation District vs. Williams, mandamus.

Turlock Irrigation District vs. Wheaton.

The termination of each was favorable to the district. In the suit of Turlock Irrigation District vs. Williams, commenced November 17, 1887, judgment was rendered May 31, 1888. The two suits, condemnation and right of way, Turlock Irrigation District vs. Wheaton, were commenced February 21, 1890. Attorneys for the district were P. J. Hazen, Hatton & Fulkerth. For the plaintiff, W. P. Baggett, A. L. Hart, W. L. Dudley, and Louttit, Woods & Levinsky. The present officers of the district are: President, E. D. Cogswell, Modesto; secretary, E. M. Williams; treasurer, C. M. Whitmore; attorney, P. J. Hazen, Modesto; engineer, E. H. Barton, La Grange. The office of the board is at Turlock.

It is proposed to complete the canal and works with all possible expedition. The area as finally estimated is 176,110 acres, about 30,000 being in Merced county.

The work on the main canal was started in March, 1890. About eighteen miles have been completed, with the exception of flumes and waste gates. One-half mile at the upper end remains to be built to complete the main canal. There will be nine drops in the main canal, eight of which have been completed. The drops vary in height from three and a half to eleven feet. There will be four tunnels in the main canal when finished, of an aggregate length of 1500 feet. Three have been completed. One of 500 feet remains yet to be constructed. The width of the

main canal varies from twenty to forty feet and the depth of water will be seven feet. In building this canal the following different material was encountered: Sandy loam, adobe, hard pan, soft sandstone, slate and a kind of basaltic rock generally called diorite or green stone.

To show the magnitude of this undertaking we publish in detail the following facts and figures, kindly furnished by Eugene H. Barton, chief engineer of the Turlock canal and La Grange dam. The work of the main canal was divided into two sections and ten subsections as follows:

Section 1, main canal—Sub-section 1 was composed entirely of slate and was very expensive to cut, costing \$5 35 per running foot, requiring also retaining riprap and puddle walls; total cost, \$21,490 25. Sub-section 2 was a thorough cut through cemented gravel, clay and hardpan, containing 90,000 cubic yards; extreme depth, 56 feet; total cost, \$25,383 33. Sub-section 3—Thorough cut through cemented gravel, hardpan, sandy soil and basal rock; extreme depth, 27 feet; total cost, \$14,851 11. Sub-section 4—Scraper work; sandy loam, containing 53,000 yards; total cost, \$8762 48. Sub-section 5—Tunnels 1, 2 and 3, as shown in illustration; total length, 1000 feet, containing 9560 yards, the approaches to the tunnels containing 8000 yards; total cost, \$14,218 98.

Section 2, Main canal—Sub-section 1. A thorough cut as shown in illustration, through cemented gravel, hard pan and soil. This cut was taken out by the hydraulic process, water having been taken from the La Grange ditch and Hydraulic Mining Company's reservoir, four miles distant, the district constructing about 7000 feet of ditch and inverted siphons to deliver the water at the pressure box, giving a 100-foot pressure to the grade line of the cut. A flume was constructed with two feet fall to the hundred, 3000 feet long, to carry material to the waste ground, containing 242,000 yards; entire cost, \$78,554 89. Sub-section 2 light scraper work, including thorough cut; extreme depth 18 feet, containing 208,000 yards. Total cost, \$44,696 94. Sub-section 3, light scraper work, containing 267,854 yards; total cost, \$45,259 03. Sub-section 4, light scraper work and thorough cut; thorough cut contained 70,000 yards of hardpan; extreme depth 30 feet. The sub-section contained altogether 218,531 yards; total cost, \$18,651 90. Sub-section 5, scraper work and heavy cutting, containing 172,000 yards; total cost, \$14,878 32; 1,282,000 yards have thus far been moved to build main canal.

In passing over the constructed work, as the writer has, it is hard to realize that so much work has been done in fourteen months.

H. M. Wilson, one of the United States geological engineers, has inspected the work of this canal and says that it represents to him the best example of American irrigation practice. He, therefore, has concluded to publish a complete report, illustrated, showing the details and the general plan of alignment, with the topography of the entire plan and route. In its magnitude and extent, and in overcoming engineering difficulties, this canal ranks first among the irrigation canals of the country, and to E. H. Barton, chief

engineer of the district, great credit is due. At one time during the construction of this canal 500 men were employed. During the greater portion of the time of construction 250 men and 250 teams were employed.

At the end of the main canal five lateral canals will be built, distributing water throughout the entire district. Smaller canals will be built from the lateral canals to deliver water to each section. Three hundred thousand dollars have already been expended on construction, and it is estimated that \$500,000 more will be needed to complete the canal system, and with incidental expenses, buying rights of way and cost of dam will bring the cost of the entire system up to \$1,100,000. The entire system will be completed and in operation in one and a half years. A weir dam will be constructed across the Tuolumne river near La Grange at a point about 1450 feet below the boundary line between Stanislaus and Tuolumne counties. The dam is to be curved in form and of rubble masonry and concrete. It will be 105 feet high, 20 feet wide and 320 feet long at the crest and 90 feet wide and 60 feet long at the base, containing about 32,000 cubic yards of rubble masonry. This dam will be built by and for the joint use of the Turlock irrigation district and the Modesto irrigation district. This will be the highest weir dam in the United States, having an overflow of over 160,000 cubic feet per second at extreme high flood. The plans for this dam were approved by Colonel Mendell, United States Government Engineer for the Pacific Coast. The structure is estimated to cost \$325,000.

L. M. Hickman, one of Stanislaus county's wealthiest landowners, who resides in this district, and is an enthusiastic irrigationist, has donated to the railroad company a quarter section of land as a town site at the terminus of the main canal of the Turlock irrigation district, and on the Oakdale extension of the Southern Pacific Railroad. The town of Hickman has been started here with good prospects of a steady growth. Contracts have already been let for an \$8000 hotel and a \$3500 church. Mr. Hickman planted this spring 320 acres of raisin grapes,

which are doing finely and looking well. This is the pioneer raisin vineyard in Stanislaus county. The board of directors and officers of the district are: E. V. Cogswell, president; R. M. Williams, secretary; John W. Mitchell, Hubert Dunn, Miller McPherson. E. H. Barton, chief engineer of the Turlock canal and La Grange dam. H. B. Waters, clerk of the board.

The district had the usual difficulty in obtaining right of way for its canals at anything like fair prices. It was compelled to pay from \$45 to \$60 an acre for right of way, while to farmers who will be greatly benefited by the canal \$15 to \$20 an acre would have been a fair price for this privilege. One farmer who is a bitter anti-irrigationist wanted \$700 an acre for right of way. The canal was not built through his land.

The Modesto Herald, always a good friend of irrigation, thus notes recent sales of bonds by the Turlock district: The landholders in the Turlock irrigation dis-

tract have awakened to the fact that the bonds of the district are a paying investment, and are buying up the same. This week L. M. Hickman and J. W. Mitchell, two of the largest landowners, purchased \$25,000 worth of bonds each, and E. V. Cogswell, C. N. Whitmore and John Amos each invested to the amount of \$5000, and lesser amounts were taken by many others. In all \$71,500 worth of bonds were sold last week to residents of the district. Besides \$15,000 worth were sold in San Francisco, and shortly before \$5000 worth were purchased by the Modesto Bank. This looks promising, and makes certain the success of irrigation under the Wright law.

Speaking of the Turlock district the *Visalia Times* says: The brunt of the fight for the establishment of the constitutionality of the Wright law was borne by the people of the Turlock district, as it was the first district organized under the law in the State. Their bonds were the first offered for sale, and the missionary work among bankers and money lenders had to be done by the agents of the Turlock district. Two years ago \$350,000 in bonds were sold to Eastern and European capitalists, a small amount being taken by San Francisco bankers. At that time it would have been an easy matter to have sold all of the bonds voted, but the directors did not feel like issuing the bonds and paying the interest on money that was not needed for immediate use. With the

\$350,000 in their treasury work was begun on the canal, and the largest part of it is now completed. If the dam can be built this year water will be turned on the sand plains of Turlock in time for next year's planting, and the people of that locality will reap their reward for the hard fight made in the cause of irrigation.

POSO DISTRICT.

SPLENDID WATER RIGHTS AND LOW COST.

A Fine Portion of Kern County to Be Supplied With Abundant Water.

Under the Irrigation District law (Wright act) of March 7, 1887, the Poso district was organized, and its officers duly elected in September, 1888.

Bonds to the value of \$500,000 were subsequently unanimously authorized of the denomination of \$500 each, and to bear interest at 6 per cent per annum, principal and interest payable as by law provided.

The report of the engineer, Mr. Barber, verified by the consulting engineer, ex-State Surveyor-General Willey, whose experience as consulting engineer to the State engineer and familiarity with irrigating projects commands the utmost confidence, demonstrated that the total cost of irrigation works, as planned for by

him, would not exceed \$270,000, and after complete and careful examination of the report in all of its details, the board of directors accepted and approved of said report, and adopted the plans and specifications. Hence proceedings were had by which the actual issue of bonds was limited to \$300,000.

The assessed value of the lands in the district, which embraces 40,000 acres, is \$502,000; actual value, \$1,500,000.

The population is about 200, and maintains three schools, each well attended.

The character of the soil in this district is a rich, deep, sandy loam of dark color, and entirely free from alkali. It is easily worked, and is well adapted for every variety of farming, especially that



Cut in Turlock Canal made by hydraulic.

of fruit and grapes; and owing to the freedom of this locality from frost the culture of the orange and lemon will no doubt in the near future be one of the most important industries.

The richness of the soil of these lands can be established from the fact that the uncultivated portion is every year covered with a heavy growth of wild feed, and also from the fact that figs, apricots, peaches, vines, etc., set out last winter, have, with the help of the natural rainfall and slight irrigation from wells, made a remarkable growth and are at the present time in a thrifty condition. When irrigated these lands will equal the best irrigated lands of

India, which support a population of five to the acre.

The water supply for the irrigation of these lands has been thoroughly and carefully investigated by the directors and their engineers, and will be obtained from Poso creek and its watershed, which covers an area of nearly 463 square miles and is found to be sufficient to irrigate 100,000 acres, through a system of reservoirs, which are situated high enough to cover all the lands in the district. The surveys, plans and estimates of the reservoirs and canals have been completed.

The district has the free and undisputed right to the water of Poso creek.

The climate is exceedingly healthy and entirely free from malaria, owing, no doubt, to the situation of these lands, which rise with a gradual incline toward the foothills of the Sierra Nevada.

The lands are situated on the east of the Southern Pacific Railroad, between the flourishing town of Delano and the city of Bakersfield, the county seat of



Cutting Turlock canal by hydraulic. (From photograph by H. M. Wilson.)

Kern county. The above railroad has a depot at Poso contiguous to the district and which is also the terminus of a branch line from Fresno via Porterville; thus it will be seen that the district has also the advantages of a well-established shipping point.

Sufficient has been said to establish the facts of the present and future prospects of this district as a grain and fruit-growing section and as a place well adapted by nature for making beautiful homes.

Total bonded debt authorized.....	\$500,000 00
Total amount required	270,000 00
Total acreage in district.....	40,000 00
Bonded debt, per acre (allowable).....	12 50
Bonded debt, per acre (required).....	6 75
Tax levy 1890 for district purposes on \$100	1 50
Average water tax, per acre, per annum (approx.) for twenty years.....	75

The cost of water for irrigation in several prominent districts in the State compares as follows with that in the Poso district:

Redlands and San Bernardino, annual rate per acre	\$6 50
Riverside, annual rate per acre.....	10 50
Alessandro, annual rate per acre.....	4 38
Perris district, annual rate per acre....	5 65
Sweetwater, annual rate per acre	7 00
Pomona, annual rate per acre.....	12 00
Big Rock Creek, annual rate per acre ..	80

Total.....	\$46 83
Average cost districts named	6 69
Poso irrigation district.....	75

The foregoing comparisons are fairly and conservatively made and speak for themselves, while in addition to these obvious advantages it is only reasonable to state that an incontestible perpetual water supply, unexcelled climatic conditions, best of soil and general aggregation of advantages should satisfy the most skeptical that no more substantial project, no more flattering proposition, can be encountered anywhere.

Emmet Barber, chief engineer in charge of the surveys, reports to the directors of the district as follows: In our surveys and

examinations of the section of country east of the district and tributary to it, we find a very extensive watershed for our source of supply, covering an area of 468 square miles, about 150 square miles of which are more than 3000 feet elevation above sea level and above the snow line, where a vast amount of water is stored in winter for use in summer, when most needed, but owing to the rapid fall of the mountain streams, from thirty to 200 feet per mile, the water descends rapidly to the plains in the early spring and winter, and it is not to be had in summer when most needed.

We have located and surveyed five reservoirs, four storage and one supply reservoir, as follows: Granite reservoir on sections 29, 30 and 31, township 29, range 30, a supply reservoir; Little Creek reservoir on sections 34 and 35, township 26, range 27, and sections 1, 2 and 3, township 27, range 27; Poso Creek reservoir on sections 25 and 26, township 27, range 27, and sections 29, 30 and 31, township 27, range 28, on Poso creek; Dyer Creek reservoir on sections 10 and 11, township 26, range 27; and Rag Gulch reservoir on sections 11, 12, 13 and 14, township 25, range 27, and section 18, township 25, range 28, storage reservoirs, all of Mount Diablo base and meridian.

We also made surveys of about thirty miles of canals as follows: From Granite reservoir to Dyer creek, a distance of 12.51 miles; from Granite station to Dyer creek, 5.50 miles, and from Poso creek reservoir, through the south and east part of the district, 14.16 miles, besides two preliminary surveys to Poso creek to determine the elevation and where to locate the two reservoirs on Poso creek. These surveys were made to determine the estimate of amount of work and cost to complete the system of water supply for the district before offering the bonds for sale.

Granite reservoir is located on Poso creek, above a narrow gorge of graphite or granite rock, thirty-eight feet wide at the bottom and 260 feet wide at a point 100 feet high. This reservoir is only intended as a supply reservoir, to divert the water from Poso creek into Little creek, Dyer creek and Rag gulch reservoirs, which are located near the east line of the district.

A masonry dam built at this reservoir would be thirty-eight feet long at the bottom and fifty feet long on the top, twenty feet thick at the bottom and ten feet thick on top, and thirty feet high, and would require 750 cubic yards of masonry, at a cost of \$12,000.

The conduit, wasteway, supply pipes and other necessary work would cost eight thousand (\$8000) dollars, or a total cost of twenty thousand (\$20,000) dollars. This is based upon the cost of masonry in the Bear Valley and Sweetwater dams.

Our survey was from the dam down Poso creek for 2000 feet, at a falling grade of ten feet per mile, and gradually diverging from the creek; at this point we leave the creek and follow along a steep mountain side, of rocky formation, to a point \$11,875 feet from the dam, where we located a tunnel 800 feet long. From the dam to this tunnel would be a pipe line and flume 2.25 miles long, or a flume might be constructed for this distance. From the end of this tunnel we commenced the survey of a canal, twenty feet wide at the bot-

tom, at a falling grade of four feet per mile, winding around the base of the mountain along a formation of loose granite rock, with gravel and clay intermixed. This canal will be five feet deep and carry three feet of water, with slope of banks of two feet horizontal to one foot perpendicular, and the lower bank will be eight feet wide on top. This canal was surveyed to Granite Station, 54,300 feet or 10.28 miles, where it leaves the granite formation. There will be required on this route of 10.28 miles of canal three tunnels, varying in length from 200 to 800 feet, and four flumes across deep gulches and watercourses, from 250 to 400 feet each.

The two pipe lines from Granite reservoir will necessarily have to be 36 inches in diameter to carry the volume of water required and discharge the water into a flume a distance of 2000 feet, where it would be carried to the tunnel, 2.24 miles from the reservoir, at a cost of twenty thousand (\$20,000) dollars. The canal, with given width and slopes, would require an excavation of 17,271 cubic yards per mile, and being largely of a rocky formation, would cost about \$3000 per mile, or a total cost of \$30,000 for the canal to Granite station.

The flumes are located as follows: One from station 230x50 to 233 is 250 feet long, just above Long Tom mine and across Long Tom gulch; the second from station 304x50 to 307 is 250 feet long, one mile west of Long Tom and across a deep gulch; the third from station 478x40 to 482x46 is 406 feet long, and the fourth from station 593x50 to 597 is 350 feet long. Total length of flume, 1256 feet, which should be 8 feet wide on the bottom and sides, 3½ feet high, and at a fall of 10 feet per mile, which would cost \$2 per lineal foot, or a total cost of \$2512.

One tunnel at station 118 by 75 is 800 feet long at the end of pipe line or flume, southeast of Long Tom, 6 feet wide and 6 feet high, would cost about \$2 50 per lineal foot, or a total of \$2000; the second at station 192 by 30 is 300 feet long (same size as above), at a cost of \$2 per lineal foot, or a total cost of \$600; the third at station 256 by 50 is 200 feet long, at a cost of \$2 per lineal foot, would cost \$400, or a total cost for tunnels of \$3000.

The canals from Granite station are made on the slope of the hills and are all easy grading, and in most parts the amount of excavations will make the embankments; they will be sixteen feet wide at the bottom, with side slope of two to one, and will require about 12,000 cubic yards per mile; they are as follows from Granite station to Granite creek: One mile from Granite creek to Little creek, three and a half miles; from Little creek to Dyer creek, two and a half miles; and from Dyer creek to Dyer creek reservoir, two and a half miles; total, nine and a half miles. These would cost about \$800 per mile, or a total cost of \$7600.

These canals discharge the water into natural channels, which have a fall of from twenty to thirty feet per mile, and would save building about fifteen miles of canals, to carry the water from Granite reservoir to Little creek, Dyer creek and Rag gulch reservoirs, to be stored in winter and spring for use in summer. These reservoirs completed would hold enough water to irrigate 70,000 acres during the

RECAPITULATION.

	Acres.	Capac.	Gall'ns.	Cost.
Poso Crk res	281.37	1,961,280,000		\$41,560
Lit'l Crk "	356.92	2,647,778,400		36,073
Dyer " "	218.16	1,368,426,000		42,701
Rag Glch "	657.65	4,269,695,600		41,243
Dist Ditches				15,000
Total Amt..	1,514.11	10,246,108,000		176,577
Upper Wr'ks				75,512
G'n'd Total				\$252,089

In summing up the advantages of Poso Irrigation district, I should say it starts out under very favorable circumstances, and with bright prospects ahead, having an abundant source of water supply, and no adverse water rights to condemn; the right of way will cost but a nominal sum, much of it being across Government land and those wanting water.

The reservoirs are located mostly on Government land, which would cost nothing; they are all easy of access, and can be built at a minimum cost, and I believe no mistakes have been made in selecting the reservoir sites.

Surveys and examinations were made at different points before the sites were selected; calculations have been fully made for headgates and drops in the ditches and for sufficient wasteways in the reservoirs, besides the dams will have a base of from 200 to 300 feet, and will be from ten to twenty feet wide on top, constructed of the best material, and will be sufficiently strong to withstand the pressure of water nearly to the top.

H. I. Willey, consulting engineer, indorses Mr. Barber's report as follows:

A careful examination and verification of the surveys, plans and estimates of Mr. Emmet Barber, C. E., as set forth in his report to the honorable board of directors of this district, justifies me in approval of the same in all essential features, only deviating from or modifying his work in some minor particulars, which, in my opinion, will make the system more perfect and economical of construction to the district.

As to the legality of the bonds issued by the Poso Irrigation district, we annex the following clear and emphatic opinion of Hon. A. L. Rhodes, who was for seventeen years a judge of the Supreme Court of California, and for many years Chief Justice. On account of his well-known ability and special knowledge of the law in regard to bonds, his opinion will command the confidence of all who know him.

SAN FRANCISCO, May 14, 1891.—*Captain D. S. Coverdale, Treasurer of Poso Irrigation District, Delano, Cal.*—DEAR SIR: I have examined the opinion of the Supreme Court of this State in the case of Henry J. Crall vs. Board of Directors of the Poso Irrigation District, decided December 15, 1879, and I find that it affirms the decree of the Superior Court of Kern county, rendered September 10, 1889. The said decree approves and confirms each and all the proceedings for the formation of the Poso Irrigation district, and all the other proceedings which may affect the legality and the validity of the bonds of the district and the order for their sale.

The decision of the Supreme Court definitely establishes the validity of all the proceedings from and including the organization of the said irrigation district up to and including the order for the issue and sale of the bonds of the district, and it holds that all persons interested in the district, or who may be affected by the proceedings had for the organization of the district, or for the issue and sale of the bonds,

are estopped to allege or prove the illegality or invalidity of any of the proceedings above mentioned; and it holds that under existing law the decree of confirmation is as conclusive against all parties interested as it would be if each and all of them had appeared and been heard in that special proceedings for confirmation.

In view of this decision of the Supreme Court I am of the opinion that the legality of the bonds of the Poso Irrigation district is fully established. Very respectfully,

A. L. RHODES.

KERN AND TULARE.

A DISTRICT WHERE THERE WAS NO OPPOSITION.

The Bonds Indorsed by the Superior Court—Progress of Canal Work.

The Kern and Tulare district is the banner district of the State so far as regards unanimity among the people who reside within its boundaries. Not a dissenting vote was cast in either the election for organization or the one on bonds. This district was also the first to issue bonds under the Eckles amendment to the Wright law, passed by the last Legislature.

This district, which, as its name implies, is located in Kern and Tulare counties, was organized in May, 1890, and comprises some 80,000 acres. The source of supply for irrigation is the Kern river. At the election for organization there were 137 votes in favor and none against, while at the bond election 144 votes were cast in favor and none in opposition. Bonds to the amount of \$700,000 were voted, and \$350,000 are now on the market.

At an election held on May 3, 1890, the following-named directors were elected: T. E. Clark, E. E. Hobart, B. M. Watts, Benjamin Thomas and E. D. Morton.

The following officers were elected: B. M. Watts, president; J. O. Sidener, secretary, and M. Schwartz, treasurer; J. S. Brooks, collector; J. O. Sidener, assessor.

Preliminary plans and estimates were ordered on July 1, 1890, and the same were adopted on the 7th of October, 1890. The engineer preparing and presenting the same was John S. Urton.

In his report to the president and board of directors of the Kern and Tulare Irrigation district, Mr. Urton states the following facts:

"In accordance with instructions received, I investigated a route for a canal to convey not less than 1500 cubic feet of water per second from Kern river to be used for the purpose of irrigating lands laying upon the plans north of the Poso Irrigation district, and embracing all the lands in the Kern and Tulare Irrigation district and all lands laying contiguous thereto, susceptible of irrigation from the same common system, together with plans and estimates of cost of constructing the same, including the necessary main dis-

tributing ditches, wasteways and all necessary expenses to complete an irrigating system for the Kern and Tulare Irrigation district with the additional territory added.

"On examination I find Kern river to be a hard and difficult river to approach with a canal, for the reason the elevations of its banks are so irregular; in many places they are low, while in other places high perpendicular bluffs set close to the river bank and in some instances extend to the water's edge. These physical conditions compel the canal line to follow the elevation in a tortuous course, making many sharp curves.

"After making an examination of the river, I located the point for the head works of the proposed canal, at a point on the right bank of Kern river in section 4, township 29 south, range 29 east, Mount Diablo base and meridian. This point was selected for the reason that it has the proper elevation to enable the supply of the high territory to overcome most of the engineering difficulties.

"The first six or eight miles of the canal, after leaving Kern river, being through sandy and porous material, the loss of water over this portion of the line by percolation, after the first few years after the opening of the canal, will be large, but this will decrease with age and use of the canal, as fine particles of clay settle into the porous material.

"From the initial point of the canal on Kern river to station 435, a distance of 8.16 miles, the displacement equals 1,294,962 cubic yards.

"This distance, 163,100 feet, or 30.89 miles, from the head of the canal on Kern river puts the canal on the plains north of all the rough land along Poso creek, from which point the cost of construction can be approximately estimated by the mile, as the surface is fairly uniform, and each mile of canal of equal dimension will require about the same amount of displacement.

"From this point, station 1631, to the north side of Dyer's gulch to station 2159, a distance of ten miles, the displacement equals 42,240 cubic yards per mile, or a total of 422,400 cubic yards. From Dyer's gulch to the north side of Rag gulch, to station 2512, a distance of 6.68 miles, the displacement equals 26,400 feet per mile, or 176,352 cubic yards for the given distance.

"From the north side of Rag gulch to the deep drain in section 13, township 24 south, range 26 east, Mount Diablo base and meridian, to station 2723, a distance of 4.01 miles, the displacement equals 20,400 cubic yards per mile, or a total for a given distance of 81,804 cubic yards. From this station to the north line of section 11, township 24, range 26 east, Mount Diablo base and meridian, the canal has a bed width of forty feet, water depth four feet, grade nine inches per mile. To this line, station 2900, a distance of 3.35 miles, the displacement equals for the given distance 64,856 cubic yards. This includes all the displacement required in the construction of the main canal from Kern river to its terminus.

"The main distributing canals are three in number and tap the main canal at the points elsewhere named in this report, the first at a point on the north side of

Dyer's gulch, in section 34, township 25, range 26 east, Mount Diablo base and meridian; the second at a point on the north side of Rag gulch, in section 34, township 24 south, range 26 east, Mount Diablo base and meridian, and the third is a continuation of the main canal to a point on the section line between sections 2 and 11, same township and range last named. These canals run directly west from the main canal, crossing the railroad to the west boundary line of the districts, a distance of ten miles each. The first two of these distributing canals have a bed width of 50 feet each, water depth, 4 feet; side slopes, $1\frac{1}{2}$ to 1; grade, 1.5 feet per mile; banks, 6 feet wide on top and $1\frac{1}{2}$ feet above the water in the canal; side slopes, $1\frac{1}{2}$ to 1, outside and inside.

The fall or slope of the surface of the country being great—from twenty to twenty-four feet per mile—these canals will have five drops from four to five feet fall each, and four headgates each for the distribution of water, per mile. The cost of construction may be computed as follows:

	Cubic Yards.	Per Cubic Yard.	Total.
Earth displaced per mile.....	18,000	8c.	\$1,440
Lumber for five drops, mile.....	20,000	\$35 PM	700
Lumber for four drops, mile.....	16,000	33 PM	560
Carpentering, excavating and filling in....	36,000	10 PM	360
			\$3,060

Thirty miles distributing canal.....	\$91,800
Three crossings for railroad, \$1000 each.....	3,000
Surveys and contingencies.....	100,000
Grand total for main canal.....	426,319

	\$621,119
Discount of 10 per cent on bonds....	69,013

Grand total.....\$690,132

The preliminary plans and estimates were adopted on October 7, 1890, and election for bonds was ordered on October 8, 1890, the value of the proposed issue being \$700,000; the election was held on November 1, 1890. The number of votes cast for the issuance of bonds was 144; in opposition, none.

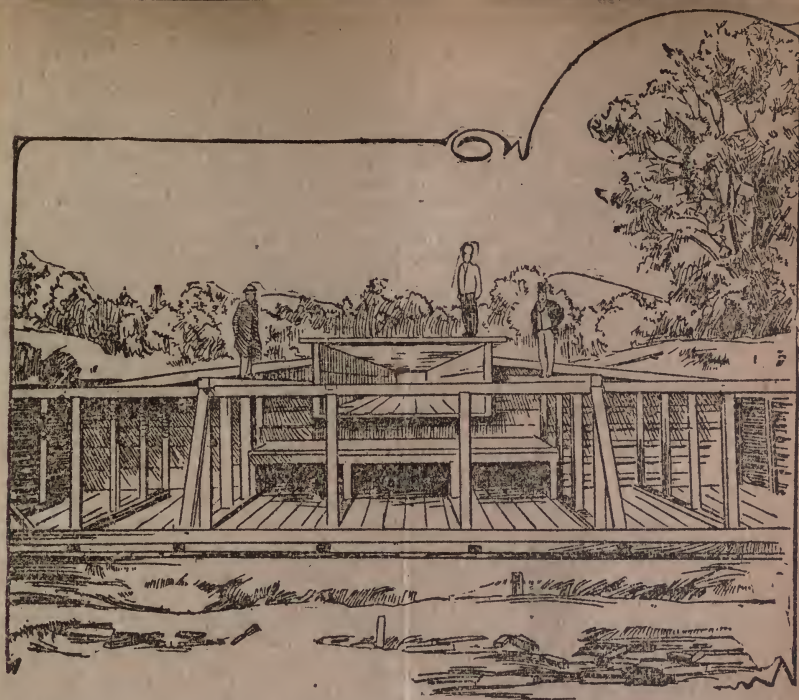
The bonds were ordered to be issued on November 3, 1890, but were not advertised.

The financial status of the district at present is good, there being funds on hand to cover all indebtedness incurred to date and to carry the current expenses for the coming year.

There has been one assessment of 1 per cent on \$8,000,465, which was made on September 9, 1890, with no opposition to collection.

The present officers of the district are: Directors—R. M. Watts (president), T. E. Clark, B. F. Hobart, Benjamin Thomas and E. B. Horton; J. O. Sidener, secretary; M. Schwartz, treasurer; all of Delano; C. C. Wright, attorney of Modesto; J. S. Urton, engineer, of Hanford; all of the State of California.

The office of the district is Delano, Kern county, Cal. The decree of confirmation of all proceedings was rendered by the Superior Court of the county of Tulare on the 5th of January, 1891. The outlook for



Head of Kaweah river flume on Tulare canal. (From photograph by E. A. S. Wyllie.)

the district could not be better.

For the purpose of determining beyond a doubt the feasibility of obtaining a supply of water for the district from the Kern river the directors of the district employed four civil and hydraulic engineers of large practical experience in irrigation work and details to investigate thoroughly the supply of water from Kern river, and also to determine the quantity of land at this date irrigated from that source, as well as the quantity of land that could be properly irrigated from that source.

The engineers occupied the larger portion of the months of March and April, 1891, in determining how much water was diverted from the river for irrigation or other purposes through canals and ditches. They measured and cross-sectioned the complete systems of J. B. Hagen & Co. and Miller & Lux and all others, and ascertained that there was at this date only 170,000 acres under a system of irrigation from said Kern river. They also ascertained that the average flow of Kern river from the month of January until August of each year would, if properly distributed and handled, irrigate 480,000 acres, or 310,000 acres more than is now irrigated from said source. When we consider that the water supply of the K. & T. I. D. is only secondary to the use of the aforesaid waters by the claimants for the aforesaid 17,000 acres already watered from that source, and that the right of this district is the first to the surplus above indicated; and that the ratio of our draft upon that surplus is the area of our district, or 84,334 acres,

against 310,000 acres susceptible of being supplied, it is impossible to suggest any reason that would justify any person in encouraging the conclusion that there is a doubt as to the water supply; excepting that deep and common design of corrupt men to deceive in order to cover their personal aspirations and retard the development of the country, to the injury and harm of the very class alone who can be depended upon to bring forth the greatest results through a system of improvement and husbandry that will never obtain where the country is claimed and controlled in large holdings by those who have axes to grind in their opposition to the irrigation district system.

The engineers who made the aforesaid estimates upon the water supply and the rights of present claimants upon the same were: John S. Urton of Hanford, Tulare county, who has perhaps built more miles of irrigation canals of large magnitude than any engineer in the State; J. D. Brown of Bakersfield, Cal., long in the employ of J. B. Haggis as his chief engineer in constructing most of his extensive irrigation works in California; P. J. Flynn, an acknowledged authority on hydraulic engineering in some of the highest schools of that profession in the United States; also Mr. McMurdo, the present County Surveyor of Kern county, Cal., and of large experience in canal construction work for irrigation purposes throughout Kern county and especially with J. B. Haggis & Co. P. J. Flynn's address is Los Angeles, Cal., in which city he has charge of the engineering for the sewerage system.

From these data it will be seen that the directors of the district are pursuing their work with a full understanding of the responsibility of the undertaking and of the consequences that must result should they, through any possible contingency, incur their homes and property without securing the full compensation anticipated by the purposes of the enterprise.

A splendid example of what water will do in this district is shown in B. M. Watts' twenty-five-acre tract, one-half mile east of Delano. Mr. Watts, who is president of the board of directors of this district, bought his place three years ago, when it was only good for a sheep range. He now has as fine an orchard and vineyard as there is in the State, and all the water he has is supplied by two windmills and a pump worked by horse-power. Mr. Watts does quite a business in supplying the surrounding country with cuttings from his one-year-old vines. He has also planted 100 orange trees this summer, and they are doing well.

T. E. Clark, one of the directors of this district, living five miles from Delano, planted twenty acres of vines two months ago and supplies water for them from a pump worked by a gasoline electric engine. The vines are all doing finely and are having a remarkable growth. But a very few have been lost, and those were from the work of gophers.

John S. Urton, the chief engineer of this district, is a canal builder in the San Joaquin valley of seventeen years' experience, and has perfected more canal systems than any other engineer in the State. He is considered one of the best canal builders in California.

The officers and directors of the district are B. M. Watts, president; T. E. Clark,

MODESTO DISTRICT.

LITIGATION RESULTING FAVORABLY TO IRRIGATION.

Source of Supply and Sketch of the Dam and Canal System—The Cost.

Not so much progress has been made in Stanislaus county in the direction of irrigation enterprise as in other portions of the great San Joaquin valley. This has not been due to any lack of sources of supply, for few counties are better provided with never-failing streams of the largest size. Rather has it been the result of a lack of necessity for irrigation in those branches of agriculture which have until recently occupied almost the entire attention of the farmers of this county. Wheat-growing has been the chief industry, and so favorable is the soil and climate that large harvests have been the rule for a long series of years.

However, the same gradual change has set in here that is seen all over the State. Agriculture, or rather wheat growing, is giving way steadily to the cultivation of fruits, and more and more attention is paid to this profitable pursuit every year. But while wheat can be successfully produced without irrigation, not so with fruit. Hence, the people have been aroused to the importance of the establishment of a comprehensive system of irrigation. The Wright law owes its authorship to a prominent resident of Stanislaus county, C. C. Wright, and, naturally, the provisions of that act were promptly taken advantage of soon after it became a part of the laws of the State.

The petition for the formation of Modesto district was presented to the Board of Supervisors May 11, 1887, and was considered by them from the date of its presentation to June 7, 1887. There was considerable opposition made to the organization of the district on the ground that the opponents did not desire irrigation by any plan. However, the petition was granted with certain modifications. The election for the district was ordered on June 7, 1887, and was held on July 9, 1887. The number of votes cast was 856; 700 for and 156 against.

The following directors were elected: J. W. Davison, E. H. Catlin, R. McHenry, A. C. Carver, W. H. Finley. Robert McHenry was elected president; J. W. Davison, secretary; I. Perkins, treasurer.

An election for bonds was ordered on November 19, 1887, and it was proposed to issue bonds for \$800,000. The election was held on December 4, 1887, and resulted: 439 ayes to 66 noes.

Bonds to the amount of \$800,000 were therefore issued and advertised January 7, 1889, and bonds to the amount of \$142,000 have been sold.

Some idea of the stability of the Modesto district can be formed from the fact that the assessed value of all the property contained therein is \$3,361,347, while the



Dam and tunnel, Turlock Canal.

B. F. Hobart, Benjamin Thomas, E. D. Morton, J. O. Sidener, secretary; J. S. Urton, chief engineer.

The effect which the completion of this irrigation system will have upon the town of Delano, which is the principal settlement in this district, can hardly be overestimated. With a densely populated and highly productive region, such as this is certain to become, nothing can prevent Delano from becoming a large and prosperous city. As a shipping and trading point it will equal any other place in the valley. The people recognize this fact and to a man are enthusiastic in support of irrigation.

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bonded indebtedness for irrigation purposes is only \$800,000. There is thus a security of four times the amount of the bonds, and this too on the basis of the assessed valuation. The actual cash value of the property which is the security for the bonds is at least 50 per cent greater than the assessment. The value which irrigation gives to the district may be seen from the fact that lands without water are worth only from \$10 to \$25 an acre, while with water they sell for \$75 to \$100. Thus by the expenditure of less than \$10 per acre the selling value of the land is trebled and quadrupled. It is indeed difficult to see how better security could be afforded for an indebtedness of such an amount as the bonds issued by this district.

Four suits have been engaged in by this district, three of which have been decided by the Supreme Court favorably to the district. The other is now pending, but as it hinges upon points already decided, its outcome cannot be different from that of the other suits.

The present officers of the district are as follows: President, A. G. Carver; directors—A. G. Carver, F. A. Crescey, G. D. Wootten, W. H. Finley and R. J. McKimmon. C. S. Abbott is secretary and O. Winnigstad chief engineer.

It may be added that the security behind the bonds of this district can be inferred from the fact that without water the lands are worth only from \$10 to \$25 an acre, while with water they command \$75 to \$100. The average cost per acre for water is only \$9.81.

Preliminary plans and estimates were ordered August 7, 1887, and were made October 20, 1887, by C. E. Grunsky, C. E.

The works as preliminarily planned consist of a concrete dam ninety feet high above low water two miles above Knight's Ferry, on the Stanislaus river, with a canal fifty feet wide on the bottom, leading to the district. The engineer's estimate of cost as rendered was \$646,000, which was rejected as too high, and a new plan was ordered to be devised.

A weir dam will be constructed across the Tuolumne river, near La Grange, at a point about 1450 feet below the county boundary line between Stanislaus and Tuolumne counties. This dam will be curved in form and built of rubble masonry and concrete. It will be about 105 feet high, 20 feet wide and 320 feet long at the crest and 90 feet wide and 60 feet long at the base. It will contain about 32,000 cubic yards of rubble masonry, and is to be built by and for the joint use of the Modesto and Tulare irrigation districts. This will be the highest weir dam in the United States, having an overflow of over 160,000 cubic feet per second at extreme high flood. The plans for this dam were approved by Colonel Mendell, United States Government Engineer for the Pacific coast. The work is estimated to cost \$425,000.

The first two miles of the canal follows the steep bluffs of the river, in places nearly perpendicular. The formation is slate and some little hard rock. The plan is to have an outside retaining wall of rock, a puddle wall and inside riprap. The larger canyons will be crossed with flumes on wooden trestles. The grade along this portion of the canal is 1.5 to the 1000 feet, the bottom width of canal six-

teen feet, with a slope of a quarter to one, and the height of water seven feet. The canal is calculated to carry 640 cubic feet of water per second, with a velocity of 4.9 feet. The grades and velocity on the flumes are greater, and the width of same on bottom will be ten feet, with seven feet depth of water. After the first two miles the canal leaves the steep slopes of the river bank and follows the plateaus and benches, where the only difficult work will be the construction of a tunnel about 1200 feet in length and the crossings of deep canyons. The grade on this portion of the canal is one foot to the mile; width of canal on bottom twenty-eight feet, with a slope of two to one; seven feet depth of water; velocity, 2.43.

The contract for section 2, consisting of the two miles of bluff work, has been let to J. D. McDougald of Stockton, and he has now a force of 250 men and about twenty teams employed on the construction of the same. The estimated amount of material in the canal to be moved is about 500,000 cubic yards of earth, about 200,000 cubic yards of rock and 25,000 cubic yards of wall. The length of the main canal is about twenty-two and one-half miles, and to construct the same will require about one year and a half. The flumes are nine in number and aggregate 3400 feet in length, and will require about 800,000 feet board measure of lumber. The height of any trestle will not exceed ninety feet. There will be twelve drops on the canal, the highest of which will be sixteen feet and will furnish 500 horse-power. The cost of the main canal will be about \$250,000. The size and location of the branch canals and distributing ditches have not as yet been determined on, but as they are intended for the purpose of distributing water over 80,000 acres of land the length and capacity of same will be considerable, and it is calculated the cost will not be less than \$300,000. It will probably take two years to finish the whole system, so that water may be put on every acre of land in the district.

BEAR VALLEY.

AN IRRIGATION SYSTEM WITHOUT A PEER.

The Reservoir That Supplies Thousands of Acres—An Immense Undertaking.

In describing the most prominent irrigation districts and systems in California we come now to one which stands pre-eminent both as regards engineering skill and the appreciation of land values through its construction. From a variety of standpoints, the Bear valley system is without a superior in the State, if not, indeed, in the world. By that gigantic enterprise lands so valueless that no one would so much as pay the taxes levied on an assessment of 50 cents an acre have been made so productive that they have sold for

\$1000 and \$2000 an acre, the crops produced actually returning a large interest upon such a valuation. A population of thousands has been provided with comfortable homes, and tens of thousands of acres of what was regarded as a hopeless desert have been converted into a garden fair almost as that of Eden. In a word, the Bear Valley system in its entirety presents one of the best examples possible of the results that have followed the union of land and water in this favored portion of the earth.

Ages ago Nature formed a lake away up in the fastnesses of the San Bernardino range. This lake was fed by the melting snows of the mountains and by the heavy rainfall, which at this point was more than quadruple that of the valley a score of miles distant. For centuries this lake remained, until some terrible convulsion rent the mountain walls that held it in and loosed the waters on the valley beneath. More centuries passed away. Where the lake had been was now a beautiful valley, with grassy meadows and purling streams. In the deep grass were herds of deer, and until man came such another delightful picture of sylvan solitude could scarce have been found. But the time came when the people in the great valley below needed water for their gardens and orchards and vineyards. All the running streams had been monopolized, and it became necessary to seek some means of saving up the floods that ran to waste during the winter season. One day there came to this hidden mountain valley a youth, recently graduated from Yale; full of enthusiasm, with a mind both to dare and do. He saw at a glance the possibilities of the old lake bed. In the restoration of the ancient lake he saw the solution of the problem that confronted the settlers on the plains, and, in the face of the discouragement of gray-haired engineers and experts, he undertook what all but a few believed was a hopeless task. Across the chasm left where the mountain was riven asunder a slender wall of stone was built. As the wall crept upward the waters accumulated behind it, and when it was completed there was the restored lake, in readiness to pour out its life-giving waters as needed in the valley beneath.

And so it has stood from that day to this, a monument both to the enterprise of its projector and constructor, Frank E. Brown, and to the ignorance of its opponents, who had demonstrated so often (on paper) that the scheme of the youthful college student was a chimera which could never stand the test of practical experiment.

What the Bear Valley reservoir is capable of doing in the way of providing a supply of water for irrigation a few points from an exhaustive paper by L. M. Holt will show. The watershed of the reservoir has an area of seventy-seven square miles, or 49,280 acres.

One foot of rainfall will put 49,280 acre feet of water in the reservoir, not allowing any wastage by seepage and evaporation, and will more than fill the present reservoir, which has a capacity of 40,040 acre feet.

Two feet of rainfall equals 98,560 acre feet; three feet of rainfall 147,840 acre

feet; four feet of rainfall, 197,120 acre feet; five feet of rainfall, 246,400 acre feet; six feet of rainfall, 295,680 acre feet; seven feet of rainfall, 344,960 acre feet; eight feet of rainfall, 394,240 acre feet; nine feet of rainfall, 443,520 acre feet; ten feet of rainfall, 492,800 acre feet, or more than enough to fill the proposed new reservoir with its 120-foot dam, which will hold 461,451 acre feet of water.

In using water from the reservoir it is estimated that the water that will be saved during the winter and spring months by drawing supplies from the Santa Ana river, and not drawing on the reservoir, will equal the amount of water lost from the above estimates by seepage and evaporation.

If the 120-foot dam had been completed in the summer of 1883, and the company had commenced at once to deliver all the water called for by all the outstanding contracts, including the 100,000 class B acre water rights, the water in the reservoir would have stood as follows:

	Acre feet.
Rainfall 1883-84.....	376,317
Season's use of water.....	110,287
Balance in reservoir.....	266,030
Rainfall in 1884-85.....	109,523
Amount then in reservoir.....	375,553
Season's use of water.....	110,287
Balance in reservoir.....	265,266
Rainfall 1885-86.....	259,082

Total amount of water..... 524,348
Seasons differ, as the rains may be heavy or light, and as they may be early or late, but this is a fair average. In furnishing water for 110,270 acres of land the Bear Valley Irrigation Company will supply approximately 24 per cent of the amount during the months of December, January, February, March, April and May. As a rule, the company will not be compelled to draw on the reservoir at all during those months for their water supply, but they can take it all from the Santa Ana river at or near the mouth of the canyon, where there is nearly always a supply of water running to waste during those months. This saving of the stored water will nearly or quite offset the questions of seepage and evaporation, for which no allowance was made in the calculations of this article.

The company have arranged to commence work on the new dam early next spring. The present dam still stands, notwithstanding the anathemas and floods that have been hurled against it, and after withstanding a fall of thirty inches of water in thirty-seven hours and the floods occasioned by such a storm, it is safe to assume that the people will be justified in calming their fears, if they ever had any, about the stability of the structure. After the present season the occupation of the present dam will be practically gone, as the new one will have superseded it in holding back the floods.

The present dam, however, has had the credit of adding many millions of wealth to this country, and of being the foundation to a system that will in time add wealth to this section equal to more than double the present assessed wealth of the county, and a good portion of that wealth will be found along the north side and west end of the great San Jacinto valley within the bounds of the Alessandro and

Perris irrigation districts.

Here we have the capacity of the Bear valley watershed to irrigate 195,639 acres of land annually, taking the rainfall of the past eight years. Besides doing this the reservoir is filled, which will add to the capacity to irrigate annually 57,680 acres, making a total of 253,321 acres.

Then the company will form a small reservoir on the Santa Ana river that will irrigate 12,000 acres when completed. This reservoir will more than fill every year.

The company also have their plans laid for constructing a canal from the Santa Ana river around and along the north side of the canyon, then through a tunnel into the reservoir; also another canal from Whitewater river around the east side of the mountains, to empty that stream and others into the upper end of the reservoir. These two canals drain a watershed of eighty-five square miles, or 55,400 acres, which, with the same rainfall that has fallen at Bear valley dam, will put into the reservoir 275,000 additional acre feet of water annually, thus giving the company a total of 537,000 acre feet of water annually with which to irrigate that number of acres of land under the flow of their canals.

Besides these systems of supply, the Bear Valley Company has still another which is now for the first time made public. In the San Jacinto Valley, a short distance from the town of Moreno, is a lake or laguna, which in time of flood becomes a large body of water. Surveys show that by throwing on earth embankment across a narrow gap between two hills at the lower extremity of the lake a reservoir may be formed which will contain water sufficient to irrigate a large area lying at a lower level in the valley. Into this reservoir the water will be turned from the Alessandro and Whitewater pipe lines when it is not needed for irrigation, and thus not a gallon will be allowed to run to waste that would otherwise be lost during the non-irrigating season. Space forbids minute description of the scheme, but the outline shows it to be one of great magnitude, and one that reflects the greatest credit upon the enterprise of those who saw the situation and were quick to seize it. To J. W. Nance of Perris belongs the credit of first suggesting and setting on foot the steps to carry out this design. It is expected that work will be commenced at an early day upon the dam.

Besides supplying the Redlands and Highlands settlements with an abundance of water, the Bear Valley company have made arrangements to furnish an ample supply to the Perris and Alessandro irrigation districts, comprising together over 43,000 acres of fertile land in the San Jacinto valley. These lands, by the way, furnish a marked illustration of the immense increase in values brought about through irrigation. So long as there was no prospect that they would ever be supplied with water they could not be sold for as much as \$5 an acre. Just as soon as it was demonstrated that water could be put on them they were eagerly bought up at \$20 to \$40 an acre, and as soon as the plans were made for putting the water on the land thousands of acres were sold at from \$60 to \$100. Before a drop of water

was actually in sight, over 8000 acres had been sold at the range of prices mentioned, and the value has been steadily increasing ever since.

A more beautiful valley than the one under discussion could scarcely be found, or one with a soil and climate better adapted to a wide range of horticulture.

The Bear Valley Irrigation Company is the strongest combination of capitalists to-day operating in Southern California—not even excepting the railroad companies that are hauling the produce of this section to market.

This seems like a strong statement, but let us consider a few facts.

The company has a capital stock of \$4,000,000. Of this \$3,000,000 are common stock and \$1,000,000 preferred.

The surplus income of the company is first used to pay an 8 per cent dividend on the preferred stock. The surplus income of the company after paying this dividend is used to pay whatever dividend it may have on the common stock.

The promoters of the enterprise—the men who owned the property prior to the formation of the new company last December—had so much confidence in the future of the undertaking that they sold their property to the new company, taking their pay—\$2,400,000—in the common stock of the company, leaving the preferred stock to be taken by those who might prefer to take the 8 per cent annual—or 4 per cent semi-annual—dividends.

As soon as the new company was fairly on its feet there came a demand for the new stock, and in one month's time \$250,000 of the stock was sold in the East at par, thus indicating the true facts of the case very clearly, that the property was worth \$4,000,000. Some purchased the preferred stock, while others preferred the common stock.

The property now owned by the Bear Valley Irrigation Company includes:

1. The Bear valley reservoir, with all the water rights thereto belonging.
2. The water flowing in the Santa Ana



Perris wooden pipe line.

river on the surface at the mouth of its canyon, subject to the claims of the north and south fork ditches.

3. The tunnel (incomplete) under the bed of the Santa Ana river, and the water secured thereby.

4. The canals, pipe lines and ditches established for the distribution of water in

the San Bernardino valley, and all contracts and income, present and prospective, of the Bear Valley Land and Water Company.

5. All the property and acquired rights of the Bear Valley and Alessandro Development Company, including 21,000 acres of land, known as the Alessandro tract, less the amounts already sold therefrom, with all contracts for sale, mortgage notes and income, present and prospective, of the said company.

The Alessandro District.

The writer some little time ago being in the southern part of the State and hearing so much said of Alessandro, its phenomenal growth, etc., was tempted to turn aside, visit the fountain head and see for himself what caused that place to be in the mind of and a prominent subject of conversation with nearly every person we met. So a visit was paid to Redlands, the headquarters of the Bear Valley Irrigation Company, and some of the chief actors of the drama were interviewed. The readers of the CHRONICLE are already familiar with the famous Bear Valley reservoir, built by the equally famous engineer, F. E. Brown, and his associates, some five years ago, to whom Redlands owes its present prosperity, as, if it had not been for them there would have been no Bear Valley dam, and if there had been no Bear Valley dam there would have been no Redlands, as it is to-day with its 3900 people, its seven churches, its public schools, railroads, horse cars, telephone, opera-house, hotels, beautiful avenues, orange groves, etc. In fact the enterprising, beautiful city of Redlands, the objective point of so many tourists, would probably never have been.

It was through the efforts of the same men that Alessandro was born. Six months ago it was only an ordinary child, a vast barren plain, covering an area of 21,000 acres, a tract of land thirteen miles in length by three to four in width, where nothing but sagebrush and cactus plants could grow. Although nature had done everything for it in location and natural scenery, it remained for the hand of man to bring water from the mountains forty miles away and cause it to bud and blossom like the rose and bring forth its fruit in due season. Capitalists from the East, seeing what had been done in Redlands during the past four years with brains and water, were ready and willing, and a company was soon formed with \$4,000,000 capital to undertake the project of reclamation. Ditches have been dug, mountains have been tunneled, the pipes have been laid through which water is now running, and orange groves, peach and prune orchards and vineyards that have sprung up since October last are to-day being irrigated at Alessandro.

Over 100 houses have been built and are now occupied by the owners thereof. Some 2500 acres are already set out to oranges and other fruit, and thousands of acres of yellow grain are now being gathered. The new town of Moreno has been laid out, and nearly \$20,000 was realized at the recent sale of town lots. Four brick blocks are nearly completed and will be occupied as soon as finished. One store is now open and doing business; two brick yards are running full time; over fifteen miles of cement pipe have been manufactured on

the grounds; a Congregational Church has been built, in which services have been held for the past two months; fountains are to-day playing at Moreno; a telephone line is already up connecting Alessandro and Moreno with the company's headquarters at Redlands. Of the original purchase of 21,000 acres, over 9000 acres have already been sold, in nearly every instance to actual settlers, whose intentions are to improve their lands at once.

There are no doubt many lovely valleys in Southern California, but one should see Alessandro before deciding on a place for a future home. It lies nearly southeast from Redlands, at a distance of eight miles, over an elegant road built by the Bear Valley Irrigation Company, at an expense of \$5000. By this road one enters Alessandro at the head of Redlands boulevard, near the mouth of the main tunnel, which is 2300 feet in length. The visitor drives down this boulevard, which is 120 feet in width, past the lands of the Alessandro Orange Grove and Fruit Company, which comprise 700 acres, nearly all of which is planted to oranges and deciduous fruits, to Moreno, a distance of four miles, where the driveway intersects with Alessandro boulevard, also 120 feet in width, running east and west the entire length of the tract, or thirteen miles, the western terminus being only seven miles from Riverside.

The California Southern Railroad passes through this western end, with two trains each way daily. There is a station at the Alessandro town site, with a good hotel now doing a fair business. Parties can bring their families here while building their homes.

Alessandro lies between Redlands and Riverside, the two places celebrated throughout the United States as raising the best oranges in the world. They will soon have to share this honor with Alessandro, as the soil, climate and general lay of the land have been pronounced by experts to be fully equal, if not superior, to either of the above places, and fully as brilliant a future is predicted for this new competitor in the field.

TULARE DISTRICT.

AN ORGANIZATION WHICH IS
WITHOUT A FLAW.

The Bonds Approved by the Court
and Placed on a Sure
Foundation.

Travelers who have had occasion to pass through the San Joaquin valley, and who have visited the different sections of that vast region need not be told that no more fertile section can be found than that which includes and immediately surrounds the city of Tulare. It is but a few years since this entire section was uninhabited, uncultivated and apparently destined to remain in that condition for an indefinite period. Sheep and cattle found sustenance on the heavy growth of natu-



Map of Bear Valley irrigating system.

ral grass which the winter rains caused the fertile soil to produce, but beyond that these waste acres afforded no return to their owners.

A few years ago some enterprising settlers decided that with water for irrigation these lands could be made productive, and in the face of great opposition they proceeded to build canals and saturate the thirsty soil. Their efforts were rewarded in a manner that they had not dreamed of. Irrigation proved indeed a magic wand, and nowhere in all the State have more wonderful results been seen than here. The desert has been converted into a garden, and the choicest fruits ever seen in the market have been grown here.

As time went on it became evident, however, that private enterprise was unequal to the task of supplying water to these vast plains, and the Wright Irrigation law was hailed as the one thing needed to enable the entire valley to be settled up. The matter of the formation of an irrigation district was discussed for some time before action was taken. The law was but imperfectly understood, and it took some time to educate the people up to the desirability of co-operation in this important matter. The success of other districts, however, finally led to decisive steps being taken.

A petition was circulated, and received

the requisite number of signatures, and on July 1, 1889, it was presented to the Board of Supervisors.

There was considerable opposition to the organization from parties who claimed that they would realize no benefit from such an organization. Some claimed that their land was sufficiently moist, others that they had other water rights, and others that their land could not be properly irrigated by the system contemplated. However, on July 13, 1889, the petition was granted as modified, most of the objectors being left out. The election for the organization of the district was held on August 24, 1889. The number of votes cast for and against was as follows: 477 ayes, 7 noes.

The following-named directors were elected: J. W. Mackie, W. B. Cartmill, A. P. Merritt, J. F. Gibson and S. Richardson; also, A. O. Erwin, assessor; A. Fay, collector, and John A. Goble, treasurer. The first meeting of the board of directors was held and organization effected on August 31, 1889.

On May 12, 1890, the board of directors ordered an election for bonds to the amount of \$500,000, to be held on June 7, 1890. The election was held with the following result: ayes, 348; noes, 50.

The board met on July 1, 1890, and ordered the issuance of bonds for the full amount offered. Two hundred thousand dollars of these bonds were advertised for

sale as required by law October 8, 1890; \$50,000 were purchased by J. Goldman & Co. December 29, 1890, at 90 per cent of their face value, and on January 2, 1891, also received at par value \$100,000 for water rights. There are yet remaining to be disposed of \$150,000 of the bonds advertised, and \$200,000 yet to be advertised as soon as the construction work demands it.

These bonds are a lien upon the lands of the entire district (including the city of Tulare, Tulare county), comprising about 37,000 acres of the present assessed value of \$1,500,000, or which means an actual value of at least \$3,500,000 to \$4,000,000, and when the entire system is completed this valuation will undoubtedly be doubled, perhaps quadrupled, by the improvements which will inevitably follow and the possibility which the presence of water implies.

The proceedings for the formation of this irrigation district and all proceedings which might affect the validity or the legality of these bonds have been examined and passed upon by the Superior Court of Tulare county, and judgment has been rendered approving and confirming the same in all respects, as may be seen from the following:

In the Superior Court of the county of Tulare, State of California; in the matter of the Tulare Irrigation district; case No. 2329, judgment.

This cause came on regularly for hearing before said court on the 15th day of September, 1890, the said board of directors appearing by J. W. Davis as its attorney and A. L. Rhodes as counsel, no person having demurred to or answered said petition herein filed or appeared in opposition thereto.

And it appearing that said court on the 11th day of August, 1890, ordered that the petition herein be set down for hearing on the 15th day of September, 1890, at the opening of court on that day at the courtroom of said court at the city of Visalia, in said county, and that the clerk of this court cause a notice, in the form prescribed by law, of the filing of said petition to be given and published in the manner prescribed by law; and it further appearing that said notice has been duly given and published for the time and in the manner prescribed by law and pursuant to said order, to wit: by the publication of said notice once a week for three successive weeks before said 15th day of September, 1890, in the *Weekly Tulare Register*, a newspaper published in the city of Tulare, in said county—the office of said board of directors being required to be kept, and having ever since the organization of said district been kept, in said county—and also by the posting of such notices for at least twenty days before the said 15th day of September, 1890, in three public places in each of the election precincts of said district.

And this cause having been tried on said 15th day of September, 1890, by the court without a jury, and the testimony, both oral and documentary, having been heard, and the same having been submitted to the court for decision, and the court having made and filed its findings of fact and conclusions of law and its order of confirmation, and ordered that judgment be entered in accordance therewith in favor of said petitioners;

Wherefore, by reason of the law and findings and orders aforesaid, it is ordered, adjudged and decreed that the said Tulare Irrigation district was duly organized by and under the direction of the Board of Supervisors of said county on or about the 2d day of September, 1889; that the first board of directors of said irrigation district was duly elected, and that all the proceedings of said Board of Supervisors, under and by virtue of which said irrigation district was reorganized and the said

first board of directors of said district was elected, be and the same are hereby approved and confirmed.

And it is further ordered, adjudged and decreed that all the proceedings had by or under



Entrance to Alessandro Pipe Line Tunnel.

the authority and direction of said board of directors, for the purpose of the issue of the bonds of said district, to the amount of five hundred thousand dollars (\$500,000), including in said proceedings the estimate made by said board of directors mentioned in said petition, of the amount of money necessary to be raised for the purpose of constructing the necessary canals and works, and acquiring the necessary property therefor, and otherwise carrying out the provisions of the said act under which said district was organized; and including in said proceedings the election mentioned in said petition, which was called and held upon the question whether the bonds of said district, in the amount aforesaid, should be issued; and also including in said proceedings the order of said board of directors that the bonds of said district in said amount, be issued

by said board in the manner and form prescribed by said act, and also including the form of said bonds, and the coupons thereto attached, be and the same are hereby approved and confirmed.

And it is further ordered, adjudged and decreed that the said Tulare Irrigation district, ever since its organization, as aforesaid, has been and now is a duly and legally organized irrigation district, and that it possesses full power and authority to issue and sell, from time to time, the bonds of said district to the amount of five hundred thousand dollars (\$500,000), and it is ordered that said petitioner pay the cost of this proceedings.

W. W. CROSS, Judge.
Decree entered this 15th day of September, 1890.

Attest: JOHN G. KNOX, Clerk.
By T. W. HOLDER, Deputy Clerk.

I hereby certify the foregoing to be a full, true and correct copy of the original decree and judgment of record and on file in my office in the above-entitled matter. In witness whereof I have hereunto set my hand and affixed the seal of the above-named court

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this 24th day of September, 1890.

JOHN G. KNOX, Clerk.

By T. W. HOLDER, Deputy Clerk.

The proceedings for the formation of the district, the issuance and sale of bonds, have been thus examined, approved and confirmed by the court. The time for appeal has expired, no appeal has been taken, and the decree of the court quoted above has thus become final. The status of the bonds is thus irrevocably fixed, and as an investment they certainly cannot be improved upon.

The present financial status of the district is good; it is on a solid basis. Included within the boundaries of the district are 36,719 acres of land, the city of Tulare being also within the limits. For 1890-91 the assessed valuation of the district was \$1,468,153. The actual cash value of the real estate is over \$3,500,000, and there are at present 1100 names on the assessment roll.

After the necessary legal formalities had been complied with the next step was the commencement of actual work on the canal system, by which water was to be diverted from the Kaweah river, the source of supply that had been chosen.

Work was commenced on the main canal March 1, 1891, and there are now $3\frac{1}{4}$ miles completed. The material encountered in building the canal consisted of earth, hardpan and solid rock. The completed work was done in one contract divided into three sections, as follows: Section 1, composed of earth and hardpan; section 2, composed of earth, hardpan and solid rock; section 3, composed principally of earth. Twenty thousand cubic yards of hardpan were removed from sections 1 and 2, 9300 cubic yards of solid rock were removed from section 2 and 40,000 cubic yards of earth were removed from section 3. In the three sections there were removed 118,000 cubic yards of earth, 9300 cubic yards of rock and 20,000 cubic yards of hardpan, making altogether 147,300 cubic yards of material removed in building $3\frac{1}{4}$ miles of the main canal at a cost of \$30,000. The hardpan required blasting, but afterward scrapers and plows were used to complete the work. In taking out the 9300 cubic yards of solid rock the work was very hard and expensive, \$1 a cubic yard being the price paid.

The main canal will have a capacity of 500 cubic feet of water per second, or more than sufficient for the entire area of the district. The portion now completed is 64 feet wide on the bottom and 84 feet on top, with an average depth of 6 feet. The average fall of the canal per mile is $1\frac{1}{2}$ feet. The side slopes of the banks are one-half to 1 and 2 to 1, and they are neatly trimmed. In fact the entire work done is the personification of neatness. The maximum grade is 3 feet per mile and the minimum 1 foot per mile. Numerous check weirs are required in order to regulate the velocity, so as to prevent too great an erosion of the banks. There have been five miles of canal built in the district, all earth excavation, no other material having been encountered. One hundred thousand cubic yards of earth have been removed at an expense of \$8000.

Two bridges carrying flumes, as shown in the accompanying illustration, have been built. The one across St. John's

river consists of two spans, 90 feet each, altogether 450 feet of trestle and bridge, to carry flume, including 250 feet of approaches. This bridge is built of iron and wood in combination resting on cylindrical piers of iron filled with concrete. There are six of these piers under the bridge supporting the flume that have a diameter of three feet each. The two on the north bank stand on a solid rock foundation. The two in the middle stand on a foundation made of piles driven as far down in the bed of the channel as possible. The other two have hardpan foundations and are so protected with piles and rock that they cannot be disturbed by high water or floating debris. The flume is lined with dressed redwood lumber and is 9 feet wide and $4\frac{1}{2}$ feet deep. The entire structure is substantially built.

The bridge across the Kaweah river is a pile bridge 352 feet long, carrying a flume which is $10\frac{1}{2}$ feet wide and $4\frac{1}{2}$ feet deep, and built similarly to the other one. The bridges, flumes, head gates, two drops and sluice gate were built at an expense of \$13,000. The bridge work reflects great credit on the builders, the San Francisco Bridge Company, and on the engineer in charge, George E. Field.

Eight and one-half miles of main canal remain to be built to complete the system to the district. It will be all valley work and will be excavated at a minimum cost. This makes the entire length of main canal $11\frac{3}{4}$ miles. There will be no dam in the river, as it is not necessary. The river will be tapped by the canal at a point where the canal bed is lower than the bed of the river. This will effect the saving of a great item of expense. A head gate built of timber 10 feet high and 60 feet wide will be built in the canal 100 feet down from the mouth. This gate will govern the flow of water. There will also be a sluice gate built one-quarter of a mile below the headgate to carry off the sand which may accumulate in the canal. There will be seven lateral canals, varying in width from 10 to 40 feet, covering a distance of 40 miles and carrying water to all parts of the district.

A storage reservoir will be located near the head of the main canal, at Paige's ranch, having a depth of twenty-five feet at its lowest part and an area at the surface of the water of 830 acres. It will contain 576,000,000 cubic feet of water. At twenty-seven feet in depth it will contain over 635,000,000 cubic feet. The reservoir will be less than a half-mile from the river and only a short distance from the main canal. It is a natural basin, and another such site would be difficult to find. A separate canal will be constructed to carry the water from the Kaweah river to the reservoir, and it will be built similarly to the main canal with headgate and will run through a smooth country which will minimize the cost. A small dam will be built at the head of the reservoir to prevent the back flow of water, but this dam will be so located that it will have to maintain but little pressure of water. At the outlet of the reservoir a cut twenty to twenty-five feet through a ridge or hill of solid rock will have to be made, thereby necessitating but a small expense for a dam. Almost the entire pressure of water, when the reservoir is full, will be against lofty mountain sides, solid as the eternal



Dam of Modesto and Tulare districts.

hills themselves.

The entire cost of the work done so far is \$47,600. The probable cost to complete the entire system, including the storage reservoir, will be \$350,000. It is hoped that the system will be completed within six or eight months, and that water will be distributed throughout the district next year. This is a very feasible project as far as expense is concerned when compared with the work and difficulties other districts have encountered.

All of the constructed work has been done in three months. This is very quick work, when all the difficulties attending it are considered, and reflects credit on the constructing force under the personal supervision of J. A. Graham, chief engineer; C. H. Congdon, construction engineer; S. S. Watson, contractor, and C. P. Randolph, superintendent of construction. The directors of the district are: J. W. Mackie, president; W. B. Cartmill, A. P. Merritt, J. F. Gibson, E. DeWitt, E. Oakford, secretary.

The district has been remarkably fortunate in not meeting with any serious hindrances. About the only difficulties so far encountered have been securing rights of way without condemnation suits. From \$50 to \$150 an acre has been asked for right of way by landowners outside of the district. So far the board has not had to pay for any rights of way to landowners in the district.

It must not be understood that the territory embraced within Tulare Irrigation district is a desert waste and will remain in that condition pending the perfection of its system of irrigation. Irrigation has been extensively employed within the district for a number of years, with the result that there are now many orchards and vineyards as thrifty as may be found in the State. But the water supply has been uncertain and landowners have not planted and improved as they will when greater certainty of water is secured.

The consummation of the plans of the district will make assurance of water absolute and will stimulate the creation of wealth as nothing else can. Indeed, the mere fact of formation of the district has imparted so much courage to property-owners that above 6000 acres contiguous to Tulare have been set to trees and vines since the work of organization began. With less than 5 per cent of poor land in the district there is practically no limit to progress, for almost any product which may be grown elsewhere with profit will find a congenial home in the deep alluvial soil of Tulare Irrigation district.

EAST RIVERSIDE.

THE WONDERS WORKED BY THE
APPLICATION OF WATER.

A District Whose Foundation Cannot
Be Excelled in Any
Particular.

As the CHRONICLE has always told us, the prosperity of large portions of California depends on the development of irrigating water. Water is the Aladdin's lamp which will by its magic presence cause stately palaces to rise from barren ground. Costly palaces and rose-clad cottages will replace the sagebrush and cactus only because the water will make the conditions of such elegant life possible. Given the rich, red soil and the stimulating sunshine, and then by adding the sparkling, life-

giving water you have the three graces, who will superintend the transforming of the desert into the garden that blossoms as the rose. The contrast between the sunburnt mesa and the dark, glossy, incense-breathing orange grove is like that between Tartarus and Paradise; and yet this contrast may be seen any day at Riverside. The two tracts are separated only by a gleaming strip of water ten or twenty feet wide.

To bring about this glorious change from utter barrenness to deepest verdure is the object of the corporation known as the East Riverside irrigation district. This association of property-holders, representing some 3000 acres of land adjoining Riverside on the east, was formed under the provisions of the Wright act last winter for the purpose of putting water upon the tract. The officers of the district are: H. W. Robinson, president of the board of directors; J. A. Van Arsdale, secretary; F. C. Finckle, chief engineer; Hargraves & Bledsoe, attorneys. The directors are: A. J. Rankin, first division; W. R. McCulley, second; G. W. Page,

owners of the Viviente taking their pay in bonds of the district at par. Included in the bargain was the use of 150 inches of water for the present year, which was immediately turned in and is now flowing through the tract. The district by this gains a great point, as it gives them another year in which to develop their own supply of 600 inches, and at the same time enables them to sell, and the purchasers to improve their lands at once.

To complete the water system for the whole tract the Viviente pipe will be lengthened somewhat at both ends, connecting at the head with their wells and being continued above the present discharging reservoir to the highest point on the lands of the district, which is 1225 feet above sea level.

Those who are skeptical about the feasibility of bringing water upon these uplands from sources many miles distant should stand where your correspondent stood the other morning, on the rim of the reservoir which receives its crystal waters from the capacious throat of the big pipe and discharges it into the cement ditch which conveys it without loss to the thirsty lands below. The scene was inspiring. It was a typical California morning. The blue sky was flecked with fleecy clouds and from our lofty standpoint there were distinctly visible the valleys of far-famed Riverside, East, South and West Riverside, also Colton, Rialto, Highlands and Mound City, the intervening hills cutting off the view of Redlands on the east and Pomona on the west.

Now is it not strange and interesting that by American enterprise and skill sixty acres of land so wet as to be worthless should be forced to yield its moisture to 3000 acres of land so dry as to be worthless, raising the value of the small tract from nothing to \$30,000, and that of the large tract from nothing to \$1,000,000! It is true that it will cost \$150,000, and perhaps \$200,000 to work this marvel, but the immediate rise in value will closely approach a million, and the resulting increase will be far more than another million in the ten years, measured by what has been done on the Riverside plain already.

By the courtesy of President Robinson, to whose business foresight and indomitable energy the success of this great enterprise is largely due, your correspondent was lately driven over the improvements now rapidly taking shape under this new canal. A handsome office is being finished off for the district's use, situated close to both the motor and Santa Fe Railroad lines in East Riverside. It stands in the district, its location being in section 6, township south, range 4 west, San Bernardino meridian.

Mr. Lyon, a Canadian gentleman, is making the largest improvements thus far. He has built a large house for his men, of whom he has twenty constantly employed. He is preparing the ground for planting sixty acres of orange trees. Mr. Lyon will expend some \$35,000 this season on his place. Mr. Hartwell has a forty-acre orchard already planted, flumes built and all in ship-shape. Messrs. Kirk, Wilson, Butler, Rankin and others have tasty homes and thrifty young groves, past which in silvery streams the living water shoots and leaps and dances as it



Finishing the Alessandro pipe line.

third; John C. Dickson, fourth; H. W. Robinson, fifth.

It did not take long for the wide-awake men at the head of this enterprise to find where their water was to come from. Some five miles northwest of Colton and eight from the highest corner of the tract lies a body of damp land full of springs. This is one of the outlets of the vast subterranean reservoir which collects at the foot of the lofty range separating San Bernardino valley from the desert. At this point by boring wells a permanent supply of artesian water is obtained. The district has purchased from Messrs. Garner and McKenzie sixty acres of these lands for the sum of \$30,000. One well has already been sunk which flows three feet above the surface of the ground at a depth of 250 feet.

Several years ago a complete and costly water system, consisting of pipe line and cemented canal, was constructed to and over a large portion of the territory of the East Riverside irrigation district. It was known as the Viviente system, and covers 2000 acres of the lands above the Gage canal. Owing to litigation about water rights the plant has never been used, and a short time ago the whole property was sold to the new district for \$100,000, the

gladly sings its way across these favored lands. To show the high estimation in which these new lands are held, I need only mention that some of them have sold already at \$300 per acre, subject to the bonds, thus bringing the total price well up toward \$400. And they are worth it. Finer soil or location never "lay out doors." The view commands the entire valley from range to range—the kind of location that brought \$800 per acre around Pasadena in the boom.

Your Chamber of Commerce says irrigation bonds are a good investment, provided the law is complied with and the lands are of good quality. This makes the bonds of this district first-class, because the land is in the same famous belt in which Riverside lies, and is of the same quality. It is admirably adapted to growing fine oranges, a business which pays an interest of 10 or 15 per cent on a value of \$2500 per acre. This is the figure recently paid for the ten-acre grove of B. F. Allen, situated some two miles from the East Riverside district line.

Owing to the elevation, 1100 to 1200 feet above the sea, these lands are even better than those of Old Riverside, because they are freer from frost.

The pipe line was built by Mr. Finckle, an engineer of tried skill and first-rate ability. It consists of about five miles of twenty-four-inch steel pipe, tested to resist a pressure four times as great as will ever be imposed upon it. The pipe is carried across the Santa Ana river under the track of the motor trestle; also across a deep arroyo by following the contour of the ground. The rest of the line is at present a cemented ditch, but the directors have decided to replace all this with steel pipe of suitable size. Wells will continue to be bored till 600 inches is obtained. These wells will all be connected underground, and the water will flow into an aerating reservoir, from which they will empty into the pipe through which they will hie themselves o'er hill and dale to the distant point where they will see daylight again among the smiling orchards and vineyards of the new-found paradise.

Those who are looking for homes in the sunny South and who wish to begin the charming process of converting \$300 land into \$3000 orchards had better come and look over these precious acres at once.

J. H. R.

ANAHEIM DISTRICT.

THE MOTHER OF THE COLONY
SYSTEM OF CALIFORNIA.

A Magnificent Showing in Support
of Bonds—Ample Security for
Their Payment.

If there is any one district in the State which has a right to be proud of the showing which it makes, no matter from what standpoint the comparison be made, it is Anaheim. It need scarcely be said that

this is a district which was not organized for speculative purposes. It is almost thirty-five years since the colony of Anaheim was first settled, and that place has long since been conceded the proud title of the mother of the colony system of California. Here may be found the very acme of what irrigation performs in the increase of land values. Bought originally for the trifling sum of \$2 an acre, the original colony lands of Anaheim can scarcely be purchased now for a thousand times as much. Fortunes have been realized here from no more than twenty acres of land, coupled with diligence and an abundant supply of water, and fortunes are yet to be realized under the new order of things, by which water will be furnished to thousands of acres of hitherto "dry lands."

While the old irrigation system of Anaheim has been productive of more wealth than one can credit, yet it became evident to the enterprising, progressive people that under the system established by the Wright law it was capable of vast extension. Examination showed that water could be had sufficient to irrigate four times the present area, and it was seen that the only thing needed was the co-operation of all parties interested in order to quadruple the population and wealth of the district.

In April, 1889, agitation upon the subject crystallized into the organization of the Anaheim irrigation district, embracing some 32,500 acres of land, the like of which for fertility is not surpassed elsewhere in the State. The necessary steps having been taken, the sum of \$600,000 in bonds was authorized to be issued for the purpose of obtaining works and water rights and extending the irrigation system already in existence. After this had been done, the district went into court, and, after a full examination of each step, the following decree was rendered:

The petition of the board of directors of the Anaheim Irrigation district, praying, among other things, that the proceedings of said board in providing for and authorizing the issue and sale of the bonds of said district be examined, approved and confirmed by this court, coming on regularly to be heard in open court on the 4th day of March, 1890, Brunson, Wilson & Lamme and J. S. Scarborough appearing for the petitioners, and De Valle & Munday and S. M. White appearing for Vicente Yorba, and the hearing thereof was duly and regularly continued by order of said court until the 27th day of March, 1890, and on the last-named day said cause duly and regularly came on in open court for trial upon the petition aforesaid, and the answer thereto of Vicente Yorba, the said parties appearing by their respective counsel, and oral and documentary evidence was introduced, said cause was further regularly continued by order of this court until the 2d day of April, 1890, on which last mentioned day said cause was argued and duly and regularly submitted to the court for its decision and determination, and the court having examined the pleadings and evidence so taken and introduced as aforesaid, and duly considered the same, and being fully advised in the premises, and it appearing to the satisfaction of the court that the board of directors of the Anaheim irrigation district duly filed in this court a petition under and in pursuance with the provisions of an act of the Legislature of this State, approved March 18, 1889, entitled "An act supplemental to an

act entitled 'An act to provide for the organization and government of irrigation districts, and to provide for the acquisition of water and other property, and for the distribution of water thereby for irrigation purposes,' approved March 7, 1887, and to provide for the examination, approval and confirmation of proceedings for the issue and sale of bonds issued under the provisions of said act."

That said petition, among other things, stated the facts showing the proceedings had for the issue and sale of the bonds of said district, and stated generally that the said irrigation district was duly organized and that the first board of directors thereof was duly elected, and that thereupon this court fixed a time for the hearing of said petition, to-wit, Monday, the 4th day of March, 1890, at 10 A. M. of that day, and ordered that the clerk of this court give and publish a notice of the filing of said petition.

And further appearing therefrom that the clerk of this court did give and publish a notice of the filing of said petition in the manner and for the time prescribed by such order and by the statutes in such case made and provided, and that said notice stated the time and place fixed for the hearing of said petition and the prayer of said petition, and that any persons interested in the organization of said district or in the proceedings for the issue or sale of the bonds of said district might, on or before the day fixed for the hearing of said petition, demur to or answer said petition, and further appearing that due and legal notice of the hearing of this application has been given as required by law, and this court having examined all the proceedings which have been taken in the organization of said district and in providing for and authorizing the issue and sale of the bonds of said district, and it appearing therefrom to the satisfaction of this court that said district was duly and legally organized, and that it has duly and legally provided for and authorized the issue and sale of the bonds of said district to the amount of six hundred thousand dollars (\$600,000), for the purpose of constructing necessary irrigating canals and works and acquiring the necessary property and rights therefor, and otherwise to carry out the provisions of an act of the Legislature of the State of California, approved March 7, 1887, entitled "An act to provide for the organization and government of irrigation districts and to provide for the acquisition of water and other property, and for the distribution of water thereby for irrigation purposes," and further appearing to the satisfaction of this court that the issue of said bonds by said district has been duly and regularly approved by a vote of the qualified electors of said district at an election held for that purpose, in conformity with the statutes in such case made and provided, and further appearing to the satisfaction of this court that every act required by law in the organization of said district and in providing for and authorizing the issue and sale of such bonds has been duly and legally performed, and that all the proceedings of said district in said matter have been taken in conformity with law, and this court having duly made and filed herein its findings of fact and conclusions of law thereon and ordered that a judgment and decree be entered herein in accordance therewith,

Now, therefore, by reason of the law in the premises and the findings of fact and conclusions of law as aforesaid, it is hereby ordered, adjudged and decreed by the court that all of the proceedings for the organization of said Anaheim irrigation district and of the board of directors thereof, and all the proceedings of said district providing for and authorizing the issue and sale of bonds of said district be, and they are, hereby approved and confirmed.

Done in open court this 18th day of April, 1890.

J. W. TOWNER,

Judge of the Superior Court.

Thereafter, on June 5, 1890, a motion for a new trial having been previously made was denied; that no appeal has ever been taken from the order denying the motion for new trial or from the judgment and no other or

further proceedings have been taken therein.

Section 6 of the act of the Legislature of this State, approved March 15, 1889, last above mentioned, reads as follows:

"Sec. 6. An appeal from an order granting or refusing a new trial, or from the judgment, must be taken by the party aggrieved within ten days after the entry of such order or judgment."

It will be observed, therefore, that the findings and decree above mentioned became final on the 16th day of June, 1890.

There are several decisions of the Supreme Court of this State bearing upon the various questions arising under the foregoing acts, among them being that of *Irr. Dist. vs. De Lappe*, 79 Id. 352, where the entire act is considered and sustained. This last decision covers almost every point which can properly arise under the provisions of the act.

It is very difficult to determine what are the actual resources of the Anaheim irrigation district, owing to the fact that there is such a difference in the value of the land situated therein, occasioned by the presence or absence of facilities for irrigation, much of which will be obviated when the system of irrigation now under consideration by the board of directors shall have been perfected. The real property alone is subject to assessment for the payment of these bonds. This comprises 23,000 acres of land, and includes within its boundaries the city of Anaheim and the flourishing village of Fullerton. There are upward of 3000 inhabitants now within the district. The real property was assessed upon the last assessment roll at \$1,600,000, which was considered at the time to be 23 per cent of its real value.

About 50 per cent thereof is now improved, and exclusive of the city of Anaheim and village of Fullerton is chiefly devoted to raising oranges, walnuts, apricots and peaches, and is valued from \$150 to \$750 per acre. The greater portion of the unimproved will be equally susceptible of improvement upon the adoption and completion of the system of irrigation now determined upon by the board of directors of this district. There is at present embraced within its boundaries twenty-eight miles of main ditches and seventy-two miles of distributive ditches, all of which it is proposed to condemn and acquire under the provisions of said act by means of the funds derived from the sale of these bonds.

The latest step in the operation of the district was taken on April 18th, when the stockholders of the Anaheim Union Water Company adopted the following resolution by an overwhelming majority:

WHEREAS, At a meeting of the board of directors of the Anaheim Union Water Company, held on April 18, 1891, the following resolution was duly adopted as a basis of settlement, to-wit: "That when the Anaheim irrigation district shall have expended the sum of \$100,000 in improvements in accordance with the plans of the engineer, now on file, then the Anaheim Union Water Company will accept \$150,000 in cash, or its equivalent in bonds, subject to the approval of the stockholders, provided the Anaheim irrigation district proceed to carry out this agreement within one year from the date of ratification by the stockholders;" and, whereas, we deem it for the best interests of the said Anaheim Union Water Company that the proposal in said resolution contained be fully carried out; now, therefore, be it

Resolved, That we hereby ratify and confirm the action of said board of directors in adopting said resolution, and hereby authorize and direct them, as far as we may legally do, to en-

ter into any and all agreements with the Anaheim irrigation district or the officers thereof to carry out in letter and spirit the resolution aforesaid, and to make, execute and deliver all deeds, contracts and agreements necessary to convey all the property of said company to said district.

What basis the bonds of this district stand upon may be seen from the fact that the canal system purchased for \$150,000 has actually had expended upon it at least three times that sum, while by the average outlay of \$18 46 an acre (the cost of supplying the whole 32,500 acres with water) the value of the present irrigated lands will be increased at least 400 per cent. The improved lands in the district are now yielding annual incomes of \$100 to \$500 per acre, and the unimproved lands will soon be in a similar condition. What better security there could be for the payment of interest and the redemption of the bonds it would be difficult to imagine.

GRAPELAND DISTRICT

AN ORGANIZATION THAT IS SOLIDLY FOUNDED.

Where the Orange and the Lemon Thrive—Land Made Valuable by Water.

One of the principal landmarks of Southern California is the mountain locally known as "Old Baldy," but more properly San Antonio. Situated just west of the Cajon pass, it towers aloft thousands of feet above the beautiful valley at its feet, in which are the prosperous, beautiful settlements of Ontario, Pomona, Riverside, etc. Close to the base of the mountain, nestled snugly against its granite foundations, is the locality known as Grapeland. With a magnificently fertile soil, a warm, sunny southern exposure, an elevation of 1700 feet, and a climate that is absolutely perfection, no one acquainted with Southern California need be told that here all manner of citrus and deciduous fruits, vines, etc., thrive with a profusion and an absence of disease or danger of damage from frost that is absolutely unknown in the more exposed contiguous sections.

On these sunny slopes oranges are grown which challenge comparison with any in the world. In this deliciously dry, desiccating climate, fruits may be dried in the open air that rival the choicest productions of the most skillfully managed evaporators. Sun-dried peaches put up here last year yielded the producers 27½ cents a pound, while raisins from Grapeland district always bring a better price than those of any other locality in this part of the State. Because of the remarkable climatic advantages enjoyed here, the raisin grape matures from ten days to two weeks earlier than elsewhere in the

valley, and there is, therefore, far less danger from damage by unseasonable rainfall than in less favored localities.

There is scarcely anything in the wide range of horticultural products known in the State that has not been successfully introduced here. A notable addition to the large area of orchard and vineyard now under cultivation at Grapeland is the 80-acre olive and French prune orchard just established by Mr. McComb, a well-known mining expert from Oro Grande. With abundance of means to enable him to purchase the most favorable location, without regard to price, he has settled here and will spare no pains to make his orchard one of the best in the State.

The land owners at Grapeland decided over a year ago that their best interests demanded their organization as an irrigation district under the provisions of the Wright act. Accordingly, after taking the necessary preliminary steps, the actual settlers upon nearly 11,000 acres of land joined in the organization of the Grapeland district. There were a few opponents of the district and these were accordingly left out. But the benefits of organization have become so apparent that these excluded land owners have now petitioned to be included within the boundaries. The vote for organization was unanimous, but subsequently a little trouble arose and it became necessary to go before the courts to have it adjusted.

The point raised in opposition to the issuance of bonds was that a number of the organizers of the district were occupants of Government lands upon which they had not secured patents, though having complied with the laws in all respects. As such questions have arisen in other localities it is worth while quoting a portion of the decision of Judge Otis of San Bernardino overruling this objection.

The case was entitled James F. Harmon vs. Grapeland Irrigation District. The Judge in his decision said:

"It is contended on part of defendant, Grapeland Irrigation District, that the amended complaint substantially admits the regularity of all the proceedings had in the formation of the district, and all subsequent proceedings, including the election as to the issuance of bonds. The complaint details the various steps taken to create the district and in furtherance of the issue of bonds; and while the complaint contains general averments of the irregularity of such steps, we fail to discover that any informality or irregularity in such proceedings is made to appear outside of such general averments. The particular allegations of what was done will control, of course, such statement of a mere general conclusion. Without referring in detail to the allegations of the complaint, it is sufficient to say that a comparison of the averments of the steps taken to organize the district, and looking to the increase of bonds and the requirements of the statute in their behalf, shows a compliance with the law, and fails to disclose any irregularity. The third paragraph of the complaint alleges a unanimous vote for the organization of a district of all votes cast, stated to have been thirty-one. The sixteenth paragraph alleges that not more than ten of them were



Scene in Grapeland District, foot of Cucamonga mountains.

the votes of legal and qualified voters, but this does not negative the idea that two-thirds of all the legal votes were in favor of the formation of a district, but, on the contrary, directly supports the same. The argument that 8396 acres of land within the district boundaries is Government land, and the argument that such being the case it was improperly included within the district, is, in our opinion, without force. If Government land cannot be assessed or burdened with liens for the satisfaction of a public indebtedness, as is conceded to be the law, then no attempt to subject such Government land to such charge would cast any cloud upon the title to such lands, and plaintiff cannot complain. If, as is also conceded, the possessory right of complainant, and the improvements made by him on such Government land, are proper subjects for assessment, there would seem to be no valid objection to such assessable property being included within the district and subjected to its proper share of the burden of taxation, and plaintiff cannot complain. As suggested by counsel, there would seem to be no substantial difference between the inclusion of Government lands within county boundaries, and the subjection of improvements on the same to taxation for county purposes, and the inclusion of Government lands within the boundaries of other political subdivisions, such as an irrigation district, and the subjection of improvements thereon to taxation. An injunction will not issue to restrain a public officer, or board of officers, from performing a duty which the law imposes upon them. It is the duty of the board of directors of every irrigation district, in the event that a majority of the votes cast on the question of issuing bonds are 'Bonds, yes' 'to immediately cause bonds to be issued' (using the words of the statute). By paragraph seven it appears that a majority voted 'Bonds, yes.' It does not appear that there were any votes of 'Bonds, no.' The duty of the board then was to forthwith issue bonds, and no injunction can run against such

issue.

"On the grounds stated therefore we are of the opinion that the demurrer to complainant's amended complaint should be sustained, the respondent discharged from the order to show cause, and the returning order vacated, and it is so ordered."

Bonds to the amount of \$200,000 were therefore issued, but have not yet been sold, as it has not been fully decided from what source the water supply will be derived. The district has rights to Lytle creek, and can also obtain water by storage, while the projectors of the Arrowhead reservoir enterprise, referred to elsewhere, also offer to furnish water for a low rate. The bonds have been issued at the rate of \$18 54 an acre, which it is believed will be sufficient to provide the entire district with water. Indeed, such has been promised. This low cost of water, by comparison with adjacent districts, is particularly gratifying, and of course adds immensely to the value of the bonds as a security. The men voting the bonds are not speculators, but are actual cultivators of their own lands, and of course are actuated solely by the desire to procure water at the lowest possible price.

The present assessed value of the district is over \$800,000, and while lands without water are practically valueless, those that have a supply are readily disposable at \$150 to \$300 an acre. At the lowest price the lands of the district will be worth over \$1,600,000 by the expenditure of the \$200,000 voted for water.

In every respect the grape land district challenges comparison with any other organized or situated in anything like similar circumstances.

The officers of the district are as follows: President, J. D. Ousterhout; secretary, E. T. Myers; directors—J. D. Ousterhout, W. D. Nevin, J. L. Adams, A. G. Perdew, E. T. Myers; treasurer, J. A. Scott; collector, A. G. Pier; assessor, E. E. Scott.

MADERA DISTRICT.

OVER THREE HUNDRED THOUSAND ACRES INCLUDED.

Sketch of the System That it Is
Proposed to Construct—
Bonds Issued.

The Madera district is the largest, with a single exception, of all that have been organized under the Wright act. It contains 305,000 acres, and careful estimates place the cost of obtaining water at \$850,000 or a little over \$2 78 an acre. It was organized in December, 1888, the vote in favor being 292, while but 5 opposing ballots were cast. On the bond proposition the vote stood 243 to 7.

This district has superior advantages over other districts in the State, by which an adequate supply of water for irrigation can be secured at the lowest cost. The principal advantage lies in the fact that the San Joaquin river, the largest stream that traverses the valley, flows along the boundary line of the district, and the Fresno and Chowchilla rivers pass through it.

In connection with the other works to be built by the district, the board of directors have filed on four large lakes, located high up the mountains, in the Minaret region. These lakes were lower than usual when filed on, yet they contained an immense amount of water.

The dimensions of the lakes are about as follows: Shadow lake, one and one-half miles long, three-quarters of a mile wide and forty feet deep; Island lake, two miles long and three-quarters of a mile wide, depth of water, thirty feet; Summit lake, three miles long and one mile wide, depth of water, thirty feet. The outlets to these lakes are very narrow and through high, rocky walls where substantial dams can be built at a minimum cost. A dam fifty feet high will suffice to reservoir eighty feet of water in the lakes, estimating the present depth of water at thirty feet, which is lower than an average. It is practicable to turn the water from the lakes into the San Joaquin river at any time when the natural supply of water from the river is not sufficient for the needs of the district. It is estimated that when the work of reservoiring shall have been completed 200,000 acres of land in the district can be covered with water one foot deep from these lakes.

These alone will irrigate the entire district after the natural flow of the river has been exhausted. These lakes are fed from the mountains of perpetual snow above them, and in several places there are beds of snow sixty feet deep. Water from this source is unfailing, and can be depended on from year to year.

The probable cost of storing this water will be from \$40,000 to \$60,000 less than

the amount set aside by the board of directors for that purpose.

Directors Roberts and Mordecai have been over the country and made a personal observation of the lakes that have been filed on. They are confident of the feasibility of the reservoir plan, and consider that it insures the district an abundance of water for all purposes.

According to the report of Geo. Manuel, engineer of the district, the survey for the main canal starts at a point on the San Joaquin river about one-quarter of a mile above the point where Fine Gold gulch enters the latter stream. At this point the river flows through a narrow canyon or gorge, the sides of which are several hundred feet high, and composed of granite rock; the river is confined to a channel sixteen feet wide at low water. The proposed dam will be about sixteen feet long on the base, about 250 feet long on the top, and will raise the water in the river about sixty feet. The situation of the dam is an extremely favorable one, both as regards stability and permanence, and the abundance and cheapness and accessibility of the materials with which to build it. Stone of unlimited quantities and of the best quality lies immediately at hand and in a situation which renders its transfer to the masonry of the dam a work of little magnitude. There is a fair wagon road now made to within about three miles of the proposed dam and this can be extended, at slight expense to the dam site itself.

As the fall of the river is very rapid above the proposed dam, and the sides of the canyon are very steep and high, there will be no damage caused to property above the proposed dam by back water from it. Starting from the dam for a distance of about 900 feet, the route traverses a mass of granite boulders of different sizes and shapes, and devoid of soil. It will probably be necessary to flume this portion, and the estimate is made with that view. From this latter point the route follows a rocky sidehill composed of soil and granite ledges and boulders. Fine Gold gulch is then encountered; distance across between points, 306 feet 8 inches. It will be necessary to flume this, starting from Fine Gold gulch and running down the river. The route of the canal is crossed at irregular intervals by short ravines or gulches coming from the adjacent hills and emptying into the San Joaquin river. They vary from 5 to 25 feet in depth and 40 to 120 feet in width in this mile. The quantity of water carried by them is insignificant, as they extend only a short distance into the hills and have a very small drainage area. They can, with few exceptions, be most easily crossed by an earthen embankment on the lower side only, the upper bank being formed by the hill, the amount of land thus flooded being insignificant and of little or no value.

The line of the canal for several miles runs through a rough broken region at first, then strikes more open country, and then for quite a distance takes advantage of natural depressions and the channel of Deep creek, which it follows for two and a half miles, then entering Sand creek. The main portion of the water will follow this channel for about twelve miles, to a point



Flume of Tulare Canal over St. John's river. (From photograph by E. A. S. Wyllie.)

where the main branch canal running to the Chowchilla river will be diverted. A portion of the water can be left in the channels of Sand and Cottonwood creeks until the western boundary of the district is reached, a distance of about thirty miles.

About the only expense in this part of the route will be the building of weirs to divert the water at the points mentioned. The main body of the water will be diverted from the creek channel at a point near the northwest corner of section 27, in township 11 south, range 18 east, where the channels of Sand creek and the Cottonwood join. From this point a survey was made, running northwest about twenty miles and terminating at the Chowchilla. This was intended for the main supply canal for that part of the district lying north of the Cottonwood. The line of this canal runs in a general direction nearly parallel with the railroad and about three miles therefrom, and terminates at a point on the Chowchilla river about three miles east of Minturn station. This canal in its course will cross several streams coming from the eastern foothills of the Sierra Nevada. It will be necessary to erect weirs or floodgates across these to discharge excessive floods.

Gates of similar character are in use in Kern county across the Kern river, and in Fresno across the Franshaw creek and other streams. As many of these channels as may be found suitable can also be used to convey water to the western side of the district at little or no expense. Branch canals running west from the main canal were also surveyed. The obstacles encountered on the main branch to the Chowchilla were slight with the exception of the stream crossings mentioned above, as the route traversed is exceptionally level, and the cuts and fills are a minimum.

The survey of the smaller branch canals shows that they can be made at slight expense, the land traversed by them being exceptionally level and having a rapid fall to the west and southwest.

SUMMARY OF COST.

Dam, flume and ditch to Fine Gold, including flume across gulch....	\$ 89,596 00
Ditch, including flumes from Fine Gold to Little Cottonwood.....	188,314 00
From Little Cottonwood to Sand Creek.....	116,163 90
Add 5 per cent for contingencies..	19,203 69

Total to Sand Creek.....\$403,277 59

Main branch to the Chowchilla, including weirs across Fresno river, etc.....	\$ 70,120 41
Railroad crossings, lateral canals, bridges, rights of way, discount on bonds, storage reservoirs, condemnation of ditches and water rights, etc.....	376,602 00

Grand total.....\$850,000 00

The board of directors of the Madera district consists of G. W. Mordecai, president; Return Roberts, J. E. Ward, J. H. Shedd and E. H. Cox (secretary). George Manuel is the chief engineer.

A series of lawsuits has been going on in this district for three years. The principal opposition to irrigation comes from large landholders. The final case was argued by C. C. Wright, attorney for the district, before the Supreme Court at Los Angeles the latter part of April. A decision is expected by June 15th, and it will undoubtedly be in favor of the district, following the line of previous decisions.

PERRIS DISTRICT.

A PERFECT AND SUBSTANTIAL ORGANIZATION.

Immense Increase in Land Values
Brought About by the Assurance of a Water Supply.

It is a pleasure to consider the basis and

history of such a district as that of Perris. As a clean-cut business proposition, straightforward and without an element of speculation in it, the Perris irrigation district challenges comparison with any other of the organizations under the Wright act. In a nutshell the proposition is this: Here are 23,000 acres of land possessing all the elements of fertility, but which, without water, are so unproductive that \$5 or \$10 an acre would be a large price. For years it was not believed that there existed any supply of water available for these lands. But at length some enterprising men appeared on the scene, and after looking the country over they demonstrated that water in abundance could be had. Immediately upon the faith of this demonstration alone the lands were eagerly sought for at \$30 to \$40 an acre. Then an irrigation district was organized, contracts entered into for an abundant supply of water piped in every direction for the average cost of \$25 an acre. Then the lands took another jump to \$80 and \$100 an acre, and when the water shall be running through the pipes (which will be within six weeks) a still further increase in values will take place. Enough has already been accomplished here to show that the largest returns ever realized in any branch of horticulture are certain to be repeated, and that these lands, when covered with productive orchards and vineyards, will return incomes of hundreds of dollars to the acre, and will sell readily for many hundred per cent more than their value to-day.

It was in May, 1890, that the Perris irrigation district was organized, the area included being 17,690 acres. Last month other property-owners petitioned to be included, and the district was therefore enlarged so as to reach nearly 23,000 acres. In the election for the organization of this district but one dissenting vote was cast, and when the proceedings were taken before the court for confirmation no contest was made. The bonds of the district are therefore placed beyond the reach of opposition in any shape.

Bonds were voted to the amount of \$442,000, and of this amount \$240,000 were paid to the Bear Valley Irrigation Company for water, which is to be delivered the coming month by pipe line through the Alessandro tunnel, described elsewhere. The balance of the bonds will be used for defraying the expense of constructing the subsidiary pipe lines for carrying the water to each individual tract.

The security that the bonds of the Perris district have can be seen from the fact that the total assessed valuation of the lands before irrigation was \$979,652, the actual cash value being at least 75 per cent greater. But with the water supply provided with the bonds the valuation will be doubled and quadrupled within a very short time. That this is no unfounded assertion may be seen from the fact that already sales have been made of unimproved lands under the pipe system

for \$300 to \$300 an acre, while just as good land, without water, is difficult of sale at \$25 an acre. No better illustration could be found of the benefits conferred by the district system of irrigation.

The officers of the Perris irrigation district are as follows: J. W. Nance, president; H. A. Plimpton, secretary; directors--J. W. Nance, George P. Oakes, W. E. Perry, Arnold E. Colby and Israel Metz. These gentlemen are each and all practical irrigators themselves, and among them are the most successful agriculturists and horticulturists in the valley. They have gone heart and soul into the work of improvement and have already surmounted obstacles that have discouraged others and kept other localities in the background.

The directors of the district are now busily engaged in perfecting their pipe-line system, in order to be in readiness for the water which will commence to be delivered to them in July by the Bear Valley Company. These pipe lines are of steel, wood and cement. Where the pressure is the heaviest the best quality of steel pipe, coated with asphaltum, is used. Several miles of redwood pipe, bound with steel bands, will also be laid, as the illustration elsewhere shows. Leading from the pressure pipes of steel and wood are laterals of vitrified clay, which will deliver the water to each tract throughout the district. When completed there will be no more perfect or economical system of irrigation in the State than that of this district.

Under the contract of the Perris district with the Bear Valley Water Company the landowners of the district have taken 20,000 of what are known as the class B water certificates. Each of these certificates calls for water enough to irrigate an acre of land, and at the time the contract was made it was worth \$15. Since then, the price has been doubled, thus giving the Perris district an immense advantage. Under the contract the Bear Valley Company agrees to deliver water at a point agreed upon to the district, free of all further expenses, as follows:

The water represented by eight hundred (800) certificates will be delivered, as above set forth, by the Bear Valley Land and Water Company on or before April 1st, A. D., 1891.

The water represented by twenty-two hundred (2200) more certificates will be delivered as above on or before April 1st, A. D., 1892.

The water represented by two thousand (2000) more certificates will be delivered as above on or before April 1st, A. D., 1893.

The water represented by two thousand (2000) more certificates will be delivered as above on or before April 1st, A. D., 1894.

The water represented by two thousand (2000) more certificates will be delivered as above on or before April 1st, A. D., 1895.

The water represented by the remainder of said sixteen thousand (16,000) certificates, and also of the additional four thousand (4000) certificates, shall be delivered as above set forth in such quantities and at such times after April 1, 1895, as the Perris irrigation district shall direct.



View near head of Turlock canal.

An enthusiastic resident of Perris writes thus concerning its many advantages and attractions: "While California as a whole offers far greater attractions as a place of residence, in the prospects of health, comfort and prosperity, than can be found in any other State, it is generally admitted that the southern counties possess a fuller measure of the advantages than the northern part of the State. Within the limits of these there are also diversities. Near the coast, where the weather is pleasant the year around, it is not warm enough to produce the orange to perfection; in the interior valleys, where the temperature as a rule is suitable to the production of semi-tropical fruits, there is frequently a lack of water for irrigation and in some places there is none for domestic use. Some parts are visited occasionally by winds which, although mere zephyrs in comparison with the hurricanes that are frequent east of the Rocky mountains, are strong enough to be disagreeable and sometimes injurious to the ripening fruit. A locality to be thoroughly desirable should possess a climate suitable to the growth of semi-tropical fruits, plenty of good water for domestic and irrigating purposes and freedom from strong winds. It should also possess good transportation facilities. The country around Perris can justly claim the possession of these advantages. At various places in the valley young orange trees may be seen which, quite unprotected, have passed through the last two winters without harm, while our raisins were ready for the packing-house last season by the time our neighbors began to pick their grapes from the vine, thus demonstrating that our climate is well suited to orange and raisin culture. With regard to our water supply it may be stated that in addition to the Bear valley reservoir we have a subterranean reservoir of the purest water at an average depth of thirty feet which is believed to be inexhaustible, a flow of about twenty miners' inches having been drawn from two seven-inch wells by a steam engine, continuously, nearly twenty-four hours, without lowering the water in the wells. It is evident from this that should an accident at any time temporar-

ily cut off our supply from Bear valley our orchards need not be in any danger from lack of water. On its comparative freedom from high winds Perris may be as much congratulated as on its abundant water supply. While it is not claimed that strong winds are quite unknown around Perris, it is claimed that they are as seldom here as anywhere in the State. Situated on one of the main lines of the great Santa Fe Railroad and within a short distance of the Southern Pacific at Colton, few towns have better transportation facilities than are offered at Perris." The writer can add that of his own personal knowledge, and after an inspection of every prominent locality in Southern California, it is his unbiased judgment that the section about Perris offers advantages which are not surpassed in any part of the State, and which are certain within a few years to make this the center of a population and a prosperity equal to anything California has ever seen.

CENTRAL DISTRICT.

THE PIONEER SYSTEM OF COLUSA COUNTY.

A Splendid Showing of Security Upon Which the Bonds Are Based.

Following are the reports of R. de Laffe and C. E. Grunsky, respectively the secretary and chief engineer of Central Irrigation district of Colusa county. These reports speak for themselves and show the favorable conditions existing in this district. As will appear from the Supreme Court decisions and other matter published elsewhere in this issue, it will be seen that the legality of Central Irriga-

tion district bonds has been fully established by the courts:

Central Irrigation District was organized on December 31, 1887. It contains 156,550 acres, which, in 1888-89, was assessed at \$2,962,922. The levy at the rate of 50 cents on each \$100 was \$14,814 61. In 1889-90 the total assessed value of the property was \$2,912,436 and the tax levy at 50 cents was \$14,562 18. In 1890-91 the assessed value was \$2,720,779, and the total levy at the rate of \$1 was \$27,267 79. The assessments for the three years have been collected and paid into the treasury. The total cash value of the real estate and the improvements thereon within the district is fully \$5,000,000.

The property, without regard to irrigation, was assessed for State and county taxes in the year 1888-89, as follows: Farming land, \$2,424,183; improvements thereon, \$31,640; town property, \$43,535; town improvements, \$116,715; total value of real estate and improvements, \$2,663,073.

At the election held November 22, 1887, for the organization of the district the "irrigationists" polled 271 votes and the "non-irrigationists" 51 votes. At the election held April 2, 1888, for the issuance of bonds in the sum of \$770,000, "bonds aye" received 225 votes and "bonds no" received 35 votes. At the election held April 2, 1890, for the election of district officers, irrigation candidates received 898 votes and non-irrigation candidates 21 votes.

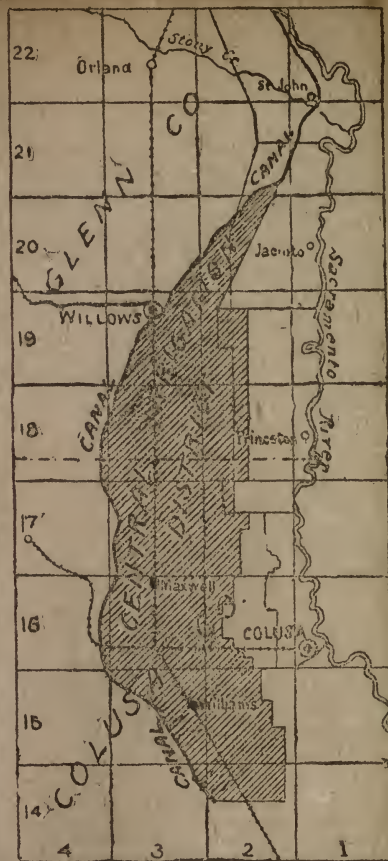
The bonds issued mature in twenty years, are dated July 1, 1888, and bear interest at the rate of 6 per cent per annum, payable semi-annually, and are of the denomination of \$500 each. Of these bonds fifty were reserved for payment to secure right of way for the canal, forty-nine of which have been delivered for that purpose, 1450 have been advertised for sale and awarded as required by law, of which 550 have been delivered and the money received therefor.

There are, therefore, 599 bonds now outstanding, aggregating the sum of \$299,500, and 930 bonds yet to be delivered. All interest on the bonds outstanding has been paid to January 1, 1891, and there is money in the district treasury to pay the interest accruing from the above date to July 1, 1891, on all outstanding bonds. The collection of assessments for the payment of the semi-annual interest on the outstanding bonds is made annually, and the proper amount set apart in the bond fund for that purpose.

Contracts amounting to the sum of \$527,000 have been let, and the contractors are now at work excavating and constructing the canal, and over \$2,000,000 have been paid on the construction of the works.

From the report of C. E. Grunsky, chief engineer of the district, it appears that the Central irrigation district lies in the very heart of Colusa county, which, as is shown by the United States census of 1880, did in that year produce 2 per cent of all the wheat grown in the United States.

This district is situated in the Sacramento valley, upon the west side of the Sacramento river. Its upper or northernmost end is about ten miles to the north-



Map of Central Irrigation District.

east of Willows (now the county seat of Glenn county.) It extends southward from that point for nearly forty miles, and it has an average width of between six and seven miles. It includes within its limits the towns of Maxwell and Williams, and skirts the town of Willows.

The district lies just to the west of the west side depression of Sacramento valley, in a region where the eye can barely detect any unevenness of the ground's surface, where soils are deep alluvion and where nature has granted an average annual rainfall (which ordinarily falls between December 1st and May 1st) of fifteen inches.

The Sacramento river, which is at high stages in the spring of the year, and remains at moderately high stages until August, and which does not fall to its lowest stages until late in autumn, is the source of water supply for Central irrigation district.

The head of the district canal will be upon the west bank of Sacramento river, at a point near the extreme northern line of Colusa (now Glenn) county. The canal will cross Stony creek at St. Johns, and will thence flow in a southwesterly direction past Willows, where it will cross the Northern Railway. Its general direction

after reaching a position about three miles west of the railroad, is southerly, until it is west of Williams, thence it is southeasterly to its termination at Cortina creek. It will be cut to a grade line falling one foot in 10,000. Its course throughout is in heavy soils, and the loss of water in transit to the lands of the district will be small. The canal will carry water six feet deep when full. It will be ninety-six feet wide between levee centers, eighty-four feet wide on the water surface when full, sixty feet wide on the bottom, and its capacity will be 750 cubic feet per second (37,600 miner's inches).

These dimensions will be maintained for a distance of over twenty miles to near Willows, where the water-surface width of the canal is first reduced to 79, and soon after to 74 feet. As the canal continues on its course along the western line of the district its width is gradually reduced until it reaches the extreme southern district line with a water-surface width of 49 feet and a bed width of 25 feet.

Water will be diverted from the Sacramento river without a dam, the canal being cut sufficiently deep to permit a free inflow of water. This inflow will be controlled by means of a massive headgate, to be constructed of brick, laid in cement. At six miles below its head the canal will cross Stony creek at St. John's. Its water will be conducted under the creek-bed in seven large wooden tubes. The inlet and outlet of this conduit will be constructed of brick, laid in cement. Throughout the entire course of the canal structures for the control of the elevation of the canal water, for the passage of drainage water across the line of the canal, for the distribution of water and for canal crossings will be provided.

At Willows the canal will cross the Northern Railway, and approaching the western edge of the valley lands will hold a southerly course to Cortina creek, about five miles south of Williams. The entire length of the canal will be sixty miles, all across smooth-surfaced valley lands.

Contracts for the construction of fifty-five miles of the canal have been let, and thirty miles of this work has at this writing been satisfactorily completed. Including the work done to June 1st 1,580,000 cubic yards of earth have been excavated by the six contractors or contracting firms now engaged on this work, at a total cost of \$209,800. The only structures in place at the present time are bridges, of which fifteen have been completed. Contracts have also been awarded for the construction of the headgate and the crossing of Stony creek.

In addition to the contracts already awarded there are contracts to the amount of \$30,000 yet to be let to insure the completion and equipment of fifty-five miles of the canal, with check wiers, inlet gates, outlets, culverts, creek flumes and works for the crossing of small coast range water ways. The canal will be further extended as the necessary rights of way are acquired.

The main canal skirts the western or highest edge of the district, which is generally less than four miles wide, and, with its completion, water will be immediately available to nearly all parts of the district through a distributing system of natural waterways, crossed at short intervals by the main canal, and all to be provided with headgates.

The lands of the district, as has already been stated, are smooth-surfaced, and

their slope is away from the canal toward the eastern boundary of the district, which lies near the bottom of the depression in the west-side plain of the Sacramento valley.

Near the canal the fall of the land toward the east or southeast is generally, about ten feet per mile. It decreases to five feet and even less as the eastern edge of the district is approached.

The exceptional smoothness of the surface of the ground which prevails in this district will facilitate the manipulation of the water. The cost of preparing lands for irrigation will be relatively small. The extension of irrigation to all parts of the district will be rapid.

The quality of soils throughout Central district, which has a length of thirty-eight miles, by an average breadth of six miles, and which contains 163,500 acres of land, must necessarily be varied. As a whole it is good. Some can be ranked with the choicest in the State, and none will be found too poor to raise alfalfa when water is brought to it under control.

ALTA DISTRICT.

A WELL-IMPROVED SECTION OF TULARE COUNTY.

Benefits Derived by Irrigators From the Provisions of the Wright Law.

The districts that have been organized under the Wright Irrigation law included a little over two million acres within their boundaries. Over one-half of the total, however, is comprised in four districts that are located within the limits of Tulare and Fresno counties. The immense supply of water in the rivers of these sections, the vast area of level lands susceptible of irrigation and the comparatively low cost of furnishing water afford the explanation of this remarkable fact.

The extensive character of the water supply of Tulare county may be judged from a glance at the geography of this region. There are flowing from the Sierras westward through the broad plain into Tulare lake, in Tulare county, King's, Kaweah and Tule rivers. White river, Deer creek and other smaller streams discharge their waters into the valley, but only in an exceptionally heavy winter do their waters flow into the lake. From the Coast range, on the west side of the valley, only a few small creeks issue, none of them of much importance for irrigation, as they are only small rills, save during the wettest portion of the rainy season. King's river, partly in Fresno and partly in Kern county, is the largest river in Southern California, and drains a catchment area of 1833 square miles; the Kaweah river is a drainage area of 608 square miles; Tule river, 446 square miles; Deer creek, 120 square miles; White river, 96 square miles. Besides these there are a few smaller streams with water sheds in the lower hills only that supply water to a small ag-

gregate area of farming land. From these streams there are constructed a number of large canals and small ditches to convey the water to the farms on the plains. The total value of these works is about \$1,000,000. The largest is the Seventy-six canal, taken from the south side of King's river, and having a carrying capacity of 1300 cubic feet of water per second. This canal measures 100 feet wide on the bottom and carries a head of water four feet in depth. From this same river are taken several other canals to furnish water to the northwestern part of the county. The Kaweah and the branches forming its delta also provide water for a number of large ditches. Others are taken from both sides of the Tule river, and two or three from Deer creek. White river furnishes no water for irrigation worthy of note. The mean rate of discharge from all these streams is about 6500 cubic feet per second.

As just remarked, there are numerous extensive irrigation systems already in existence in Tulare county. Serious objections, however, have arisen to the manner in which these enterprises have been carried out, and when the Wright act was passed and its beneficial workings were demonstrated the district system was seen to promise the relief that was so much needed. After considerable discussion, a large number of property-owners who were dependent upon one of the old canal systems for water decided to organize under the new law, the result being the formation of the Alta district.

It was in July, 1888, that the organization was effected and some 30,000 acres were included within the boundaries of the district. There was very little opposition, the vote standing 326 ayes to 19 noes. To make matters doubly assured, the proceedings taken for the organization of the district were reviewed by the Superior Court and judgment given in their favor, no contest being made upon any point.

In February, 1889, an election for bonds was held, and the bonds were ordered issued by a vote of 242 ayes to 38 noes. Bonds to the amount of \$675,000 were voted, and subsequently the directors transferred \$410,000 worth in payment for the water rights and irrigation system of the '76 Canal Company.

The security that exists for these bonds may be judged from the fact that the assessed valuation of the property in the district is \$2,507,000, the actual valuation being from 50 to 100 per cent greater. About two-thirds of the lands are already under irrigation, and within a few years the entire district will be cultivated by the aid of water.

This district affords one of the best examples of the great addition made to the value of land by irrigation. Land in this section which has no hope of a water supply is slow of sale at \$1 an acre. The same land, when supplied with water, but still unimproved, brings readily from \$50 to \$75 an acre, and when improved the value is quadrupled, and even more. Yet the average cost per acre of supplying water is but \$5 19. Thus with this small expenditure valueless lands are increased several thousand per cent.

In view of these perfectly well substantiated facts it certainly will be difficult to specify in what particular the bonds of

this district could have a more secure foundation, particularly when it is borne in mind that this is no experiment, but that the canal system is already in operation, most of the lands are now under irrigation, and the necessary income is already being derived from them to meet every charge for interest and redemption of the bonds.

And now a word about the canal system of the Alta district, which is the famous '76 canal organization. The water for the system is taken from King's river, four miles above the head of any other canal, the point of delivery being in the mountains. It is diverted by means of a canal 100 feet wide at the bottom, with slopes of three feet horizontal to one foot perpendicular, and intended to carry five feet depth of water. The fall of the canal is four feet to the mile, and it will deliver 1400 cubic feet per second. This is the main canal, and it is built out thirteen miles on the plains. There it is divided into two sixty-foot canals. One called the Traver branch has a fall of eight feet to the mile and crosses the railroad at Traver. The other is called the East branch. This is a grade canal running around the eastern and southeastern boundaries of the district. From these canals innumerable laterals are built, covering many thousands of acres in the district and carrying water to nearly all the different sections. The capacity of the canal is sufficient to cover all the land in the district a foot deep every forty-six days.

There are fifty-six miles of main canal. The first section, as already mentioned, is thirteen miles long, the Traver branch is twenty-five miles in length and the east branch eighteen miles. The canal system cost \$210,000, and \$100,000 was paid for additional water rights, which will be utilized to furnish the entire district with water.

The diversion of the water from the river into the canal is made by means of a brush dam, which cost \$5000.

The officers of the Alta district are as follows: President, W. S. Goodwin; secretary, G. H. Weaver; directors—W. S. Goodwin, E. E. Giddings, P. Y. Baker, J. D. Vannoy and T. L. Reed.

The benefits of the district system of irrigation have a full exemplification in the history of the Alta district. When the '76 canal was in the hands of the original owners, those desiring water were required to pay \$5 per acre for the privilege of obtaining it, and an additional sum of 50 cents per acre per annum to keep the canal in repair. During the last two or three years of its existence the company had doubted on its rates as above given. But counting the figures as first given and allowing interest on the investment at the rate of 10 per cent, it will be seen that in twenty years the farmer would have expended \$25 per acre for irrigating the land, and at the end of that time would have had no proprietary interest in the water of the canal. Simply the privilege of continuing to pay this price, or any other sum the '76 company chose to collect, for the next thirty years.

There are 130,000 acres of land in the district. Bonds have been sold to the amount of \$410,000 and it will require an additional \$65,000 to complete the water

system—making a total cost of \$475,000. This is a debt of only \$3 65 an acre. The average yearly running expenses will be about 20 cents an acre and the interest on the bonds about 22 cents an acre annually. Thus figured this is an expense of only \$12 05 an acre in twenty years—less than half the price that would be paid to the '76 company. These figures are based on acreage. There will be a reduction on acreage, however, from the fact that improvements are assessed, and this includes town lots in five thriving towns and an assessment on two lines of railroad.

KRAFT DISTRICT.

AMPLE SECURITY FOR THE BONDS THAT ARE ISSUED.

A Good Source of Supply Available at Low Cost—The Engineer's Report.

The Kraft irrigation district was organized in 1888 under the Wright act. It is located on the north side of Stony creek and in the counties of Colusa and Tehama. The district is particularly well adapted for irrigation, having a light porous soil almost entirely level, with a gentle slope of eight or nine feet to the mile toward the Sacramento river. It is situated between two streams, Stony and Dry creeks. The former is in reality a river, rising in the coast range, not far from Clear lake, and flowing in a northerly direction between some low hills and the foot of the mountains and receiving the whole drainage of their eastern flank for over sixty miles. It drains a water shed of over 800 square miles with an average rainfall of twenty-five inches per annum. It breaks through the foothills at the Black or Stony creek buttes and flows eastward to the Sacramento river.

Kraft district comprises 13,500 acres, and was organized with only two dissenting votes. The bonds were voted unanimously to the amount of \$80,000, or \$6 per acre. The land in the district is assessed by the county at \$15 and \$17 per acre, and sells at from \$30 to \$45 per acre. The whole proceeding in the organization and issue of bonds has been approved by the Superior Court. The preliminary and permanent surveys are made, and everything is ready to go to work just as soon as the bonds are sold.

This section is capable of producing any kind of fruit grown in California, and much earlier than in many of the southern counties. At present there are very nearly 3000 orange trees in this district. Two years ago the Board of Horticulture reported 1963. They are all doing very well, most of them without any water whatever. M. Billion has twenty-five bearing orange trees that have never

had water, but still are doing as nicely as any in the State. Grapes also do very well without water. The climate is admirably suited to the raising of all fruits. The average temperature is 62 deg.; average rainfall, 16 inches. The frost is very light, some years none whatever appearing. The district lies on a sort of wash from the mountains and is consequently a little raised from the surrounding land. The soil is light and porous and is consequently warmer than the heavier soil in the surrounding region. With plenty of water, which can be very easily obtained, this section will make one of the best fruit growing localities in the State. Wherever fruit has been grown on a small scale with the help of a little irrigation it has done remarkably well.

The proposed plan of irrigation will be one of the easiest and cheapest in the State. The source of supply will be from Stony creek. A dam will be put across that stream where it flows between two buttes, and starting from bedrock will be about sixteen feet in height, which will raise the water four feet above the present level. The length of the dam will be about 500 feet, and it will be built of heavy timber, after the crib style. The main canal will start from the head of the dam and will be sixteen feet wide at the bottom and will carry three feet depth of water. Starting from the dam



Kraft Irrigation District.

it runs in an easterly direction for six miles, where it branches out into three sections. These branches will be ten feet

wide at the bottom and the combined length of seventeen miles. A natural dry creek will be utilized for two and a half miles of the six miles of main creek. The district is so level that the deepest cut will only be about eleven feet, and that only for about 300 feet. The average cut of the main ditch will only be about five feet and that of the branches about two feet. The soil being light, the expense of the ditches will be comparatively small. In fact the work to be done in the district will be less expensive than almost any other district in the State. The total cost of the excavating is estimated at \$30,800, and that of the structures, including dam, head gate, waste gate, check weirs, etc., and 10 per cent for engineer expenses and contingencies, is \$31,440, making the whole estimated expense of getting everything in running order, \$62,240. This is only \$4.62 on the acre. This entire work can be completed in six months after the bonds are sold, and it is estimated that lands now being held from \$25 to \$35 per acre will be sold for at least \$100 when the ditches are completed. The land in the present district comprises 13,000 acres, but there are 25,004 more of the finest land in the State that was not originally included in the district when formed, but will be eventually compelled to draw its water supply from this district.

The prime movers in the organization of this district were J. H. Rodgers, T. Z. Knock, M. O'Hair, William O'Hair, J. B. Morricey and Thomas Brown. The officers of the district are: Thomas Brown, president; C. C. Scribner, treasurer; William Miller, secretary; C. E. Grunsky, engineer. Directors—Thomas Brown, J. B. Morricey, W. O'Hair, Samuel Ellison and J. H. Kraft.

In January, 1888, preliminary surveys were made for the Kraft irrigation district by C. E. Grunsky to determine what works would be necessary for its irrigation, and to serve as a basis for the estimates of cost about to be made by the board of directors of the district. From the report submitted by him at that time the following extracts are made:

"Stony creek, which is your source of water supply, emerges from between outlying hills of the Coast range, about ten miles west of Orland. Lava capped buttes rise to the height of 100 feet or more upon each side of the creek at this point. Creek bottom lands, which gradually widen as the creek flows eastward, flank the creek below the point indicated, and gradually merge into the west side plains of the Sacramento valley. The greatest portion of the bottom lands that thus lie between the low hills and mesas, forming the east-most spurs of the Coast range, is upon the south side of the creek. The creek follows quite closely the low bluff or declivity, in which the hills and mesas along its north bank break off toward the creek.

"Stony creek has a catchment basin between the summit of the Coast range and an outlying eastern spur of the mountains which has an area of about 740 square miles. Although some snow falls every winter in the higher portion of the drainage basin, none of this lies on any of the mountains throughout the year. Most of the snow which falls within the line of the creek's watershed melts early each season, and after the spring months the flow of

the creek gradually decreases, reaching its lowest stage at some time in the months of July to September. Even at its lowest stage the creek has a flow of about thirty cubic feet per second (1500 miner's inches). This water remains visible in the bed of the creek to near the point where Stony creek passes between the buttes, then rapidly disappears, sinking into the gravel deposits in the bed of the creek, and in ordinary seasons the water of the creek at its lowest stage does not reach the ridge near Orland.

"The flow of the creek at an ordinary water stage ranges from 500 to 1000 cubic feet per second, and at its high stages the creek carries from five to twenty times more than the greatest amount named.

"The mean annual rainfall, averaged for the entire drainage basin of Stony creek, is about twenty-five inches. Nearly all of this rain falls at irregular intervals between the 1st of December and the 1st of May of each season. Heavy rains after the 1st of May are, however, not infrequent.

"As the drainage basin of Stony creek is for the most part a region of hills and low mountains, the moisture which falls in it flows to the creek quite rapidly, and the creek does not maintain its winter flow long after the close of the rainy season.

"The creek can be relied on to supply an abundance of water to all lands that are susceptible of irrigation from it during the winter months and as late as June of each year. After that time the flow of the creek decreases gradually, and, as already stated, the flow at its lowest stage is small.

"There can be no question as to the reliability of Stony creek as a source of water supply for the lands of Kraft irrigation district, whether the diversion of water for the use of the district be made at the point where the flow of the creek is perennial or at some convenient point further down stream. At the same time it must be borne in mind that the higher up the creek toward the buttes that the diversion be made the more reliable does the creek become as a source of supply, and the longer (within short limits) will be the time of a free flow in the district canals each season. All else being equal it is therefore desirable to make diversion as high up the stream as can conveniently be done.

"The lands of Kraft irrigation district, with but slight exception, are very favorably located for irrigation. The area of irrigable lands in the district is about 12,000 acres. The surface of the ground is quite smooth, and has a fall from west to east of about thirteen feet per mile. Several low, flat-topped, broad ridges extend through the district from west to east, and on these it is proposed to locate the main canals whenever practicable. These ridges are only three to seven feet higher than the broad depressions between them."

The security which the bonds of this district afford can be seen from the following facts: The vote on district organization and issuance of bonds was unanimously in favor thereof. The Superior Court has affirmed all the proceedings. The assessed value of the district is \$250,000, or more than three times the bonded indebtedness, while by the aid of water this value will be increased several hundred per cent. In fact there is no district

in the State which has a better foundation than this.

Selling the Bonds.

As will be seen in the foregoing article on irrigation, there have been thirty districts formed embracing about 2,000,000 acres of land, for the irrigation of which \$11,000,000 worth of bonds have been floated. Investors seeking information relative to bonds of any issue can obtain it from I. R. Wilbur, room 85, CHRONICLE building. He is largely interested in the placing of these irrigation bonds, and has thus far placed about \$300,000 worth. He has correspondents in all parts of the world, and so is peculiarly well able to negotiate their sale and place them advantageously. These bonds are the best security obtainable, from the fact that the Supreme Court has held repeatedly that the law making them a first lien on the property covered by them is perfectly sound. In other words, no indebtedness against the land can be collected until these bonds are redeemed.

IRRIGATION IN CALIFORNIA.

The CHRONICLE in its issue of this morning presents a complete, accurate and exhaustive study of the subject of irrigation in California, a subject which is second in importance to nothing in the history of the State, the discovery of gold not excepted. It has taken the question up in all its bearings, showing the origin and growth of the system, its application in practical use, the results already attained and the future which attends it.

This the CHRONICLE has done because it recognizes the necessity for what may well be called an active campaign of education. The State system of irrigation, begun under the act of the Legislature known as the Wright law, and carried along by acts supplementary to and confirmatory of the original law, provides for the creation of irrigation districts and the issuance and sale of bonds of such districts to provide funds for the necessary irrigation work. To explain the system, to enlist public sentiment on the side of irrigation, to demonstrate the value of the security which the bonds of properly and legally constituted districts offer, and to convince capital that it has nothing to fear from investment in such securities, has been the constant aim and purpose of the CHRONICLE, and that aim and purpose finds its highest expression and fullest fruition in the present issue.

To make a full and fair presentation of the case, the CHRONICLE has not been sparing of pains, labor, time or money.

Not only has it collated facts and statistics on the subject of irrigation, but it has elicited and publishes to-day the opinions of capitalists, business men, lawyers and students of irrigation questions; and to every Californian the opinions of such men as C. P. Huntington, Francis G. Newlands, A. L. Rhodes and J. R. Jarboe will carry absolute conviction, since they are not given to putting their signatures to documents which are not the result of close study and careful inquiry and consideration.

In addition to these the CHRONICLE presents the opinions of bankers and capitalists, men who have money of others and of their own to invest, and whose indorsement of irrigation bonds is based, not upon sentiment, but upon the cold, calculating principles of business; men whose judgment is almost unerring and who have developed a sort of sixth sense, that of detecting at a glance a safe and desirable investment. These men do not hesitate to say what they think of the system of irrigation which has been adopted in California, and it is safe to trust to their judgment.

It may be said with entire truth that the only serious obstacle to the rapid advancement of the irrigation system of California is unfamiliarity with the subject. The plan of uniting the water and the land is comparatively a new one, the bonds of the various districts are a novel kind of security and the whole thing is regarded with some querying, if not with real suspicion, simply because it is not understood. It has been the aim of the CHRONICLE, particularly in this special number, to remove the general ignorance and unfamiliarity with this question, and we cannot believe that we have come in any way short of success.

The CHRONICLE desires, with all the earnestness possible, to impress upon every citizen of California the vast importance of this matter of irrigation. It is a subject in which the State as a whole is or should be interested. As Secretary Rusk of the Department of Agriculture said after his return from a visit to the State, California has infinite possibilities of development in the varied domain of agriculture, and it is certain that the future of the State is indissolubly connected with the question of irrigation. In no other

way than by irrigation can the farmers, the horticulturists and the viticulturists of this State insure themselves against the deficient crops consequent upon a dry winter; but with a complete and properly managed irrigation system they may defy the frowns of Jupiter Pluvius and be practically independent of a dry season.

The united effort of all the newspapers in California, were such a combination imaginable, could not advance the interests of irrigation without the co-operation of the people of the State. We can only point out the way. The march of progress and prosperity must be made by the people. We have shown that the advancement of the material interests of California is dependent upon the success of the irrigation system, and have demonstrated in every way possible the merits and advantages of the scheme. Here we must stop. The people must decide for themselves, and, having decided, must act. We have made what we firmly believe to be a perfect case for the cause of irrigation in California, and we can do no more.

The CHRONICLE cannot believe that the people of this State are so blind to their own interests as to disregard the lessons which this paper has been instrumental in teaching, or to pass over without study or attention the array of facts, figures and expert opinion which is presented to them. Californians are too intelligent to neglect or overlook a matter which is so directly in their own interest, and the CHRONICLE takes a proper and justifiable pride in asserting that its present issue is in effect a cyclopedia of information and opinion on the great question of the day, and that no citizen of California can afford to neglect the lessons which it teaches.



ORGANIC ACT.

FROM THE POLITICAL CODE OF CALIFORNIA.

ARTICLE I.

OBJECT OF UNIVERSITY.

SECTION 1385. The University of California (located in Alameda County) has for its object general instruction and education in all the departments of science, literature, art, industrial and professional pursuits, and special instruction for the professions of agriculture, the mechanic arts, mining, military science, civil engineering, law, medicine, and commerce.

COLLEGES TO BE MAINTAINED.

SEC. 1386. There must be maintained in the University:

1. A College of Letters;
2. A College or Colleges of Science, including Agriculture, Mechanics, Mining, Engineering, Chemistry, and such other specialties as the Board of Regents may determine;
3. Colleges of Medicine and Law;
4. Such other Colleges as the Board of Regents may establish.

SCOPE OF COLLEGE OF LETTERS.

SEC. 1387. The College of Letters must embrace a liberal course of instruction in language, literature, and philosophy.

COURSE OF INSTRUCTION.

SEC. 1388. Each full course of instruction consists of its appropriate studies and courses, to be determined by the Board of Regents.

PRESIDENT OF THE UNIVERSITY.

SEC. 1389. The President of the University is the executive head of the institution in all its departments, except as herein otherwise provided.

DUTIES OF PRESIDENT.

SEC. 1390. He must, subject to the Board of Regents, give general direction to the practical affairs of the several Colleges, and in the recess of the Board of Regents may remove any employé or subordinate officer not a member of any Faculty, and supply, for the time being, any vacancies thus

created; and until the Regents otherwise direct, he is charged with the duties of one of the professorships.

GOVERNMENT AND DISCIPLINE.

SEC. 1391. The immediate government of the several Colleges is intrusted to their respective Faculties, each of which must have its own organization, regulate its own affairs, and may recommend the course of study and the text-books to be used.

STUDENTS.

SEC. 1392. Any resident of California, of the age of fourteen years or upwards, of approved moral character, may enter himself in the University as a student at large, and receive tuition in any branches of instruction at the time when the same are given in their regular course, on such terms as the Board of Regents may prescribe.

FEES AND RATES OF TUITION.*

SEC. 1393. An admission fee and rates of tuition fixed by the Board of Regents must be required of each pupil, except as herein otherwise provided.

SEC. 1394. As soon as the income of the University shall permit, admission and tuition must be free to all residents of the State; and the Regents must so apportion the representation of students, according to population, that all portions of the State may enjoy equal privileges therein.

FREE SCHOLARSHIP.

SEC. 1395. If approved by the Board of Regents, scholarships may be established in the University by any persons, for the purpose of private benefaction or of affording tuition in any course of the University free from the ordinary charges, to any scholar in the public schools of the State who may distinguish himself in study, according to the recommendation of his teachers, and who passes the examination required for the grade at which he wishes to enter the University.

COLLEGES MAY BE AFFILIATED WITH THE UNIVERSITY.

SEC. 1396. The Board of Regents may affiliate with the University any incorporated college of medicine, law, or other special course of instruction, upon such terms as may be deemed expedient; and such college may retain the control of its own property, have its own Boards of Trustees, Faculties, and Presidents, respectively; and the students of such Colleges recommended by the respective Faculties thereof may receive from the University the degrees of those Colleges.

*Tuition is now wholly free to residents of the State in the Colleges of Science and of Letters.

ANNUAL EXAMINATION FOR DEGREES.

SEC. 1397. The examinations for degrees must be annual. Students who have passed not less than a year as residents in any college, academy, or school in this State, and who, after examination by the Faculty thereof, are recommended by them as proficient candidates for any degree in any regular course of the University, must be examined therefor at the annual examination; and, on passing such examination, may receive the degree and diploma of that course, and rank as graduates.

SEC. 1398. All students of the University who have been residents thereat for not less than one year, and all graduates thereof, may present themselves for examination in any course at the annual examinations, and on passing such examination, may receive the degree and diploma of that course.

SEC. 1399. Upon such examinations each professor and instructor of that course may cast one vote, by ballot, upon each application for recommendation to the Board of Regents for a degree.

DEGREES TO GRADUATES OF AFFILIATED COLLEGES.

SEC. 1400. Graduates of the College of California, and of any incorporated college affiliated with the University, may receive the degrees from and rank as graduates of the University.

CERTIFICATES OF PROFICIENCY.

SEC. 1401. The Board of Regents may also confer certificates of proficiency in any branch of study upon such students of the University as upon examination are found entitled to the same.

DEGREES.

SEC. 1402. The proper degree of each College must be conferred at the end of the course upon such students as, having completed the same, are found proficient therein.

DEGREES IN COLLEGE OF LETTERS.

SEC. 1403. The degree of Bachelor of Arts, and afterwards the degree of Master of Arts, in usual course, must be conferred upon the graduates of the College of Letters.

SYSTEM OF MANUAL LABOR IN CONNECTION WITH THE AGRICULTURAL COLLEGE.

SEC. 1404. A system of moderate manual labor must be established in connection with the Agricultural College, upon its agricultural and ornamental grounds, for practical education in agriculture and landscape gardening.

SECTARIAN, ETC., TESTS PROHIBITED.

SEC. 1405. No sectarian, political, or partisan test must ever be allowed

or exercised in the appointment of Regents or in the election of professors, teachers, or other officers of the University, or in the admission of students thereto, or for any purpose whatsoever; nor must the majority of the Board of Regents be of any one religious sect or of no religious belief.

ARTICLE II.

ENDOWMENT OF UNIVERSITY.

SEC. 1415. The endowment of the University is:

1. The proceeds of the sale of the seventy-two sections of land granted to the State for a seminary of learning;

2. The proceeds of the ten sections of land granted to the State for public buildings;

3. The income derived from the investments of the proceeds of the sale of the lands, or of the scrip thereof, or of any part thereof, granted to this State for the endowment, support, and maintenance of at least one college, where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts;

4. The income of the fund set apart by "An Act for the endowment of the University of California," approved April second, eighteen hundred and seventy, which is continued in force;

5. Donations;

6. The State of California, in its corporate capacity, may take by grant, gift, devise, or bequest, any property for the use of the University, and hold the same, and apply the funds arising therefrom, through the Regents of the University, for the support of the University, as provided in Article IX, section four, of the Constitution.

7. The Regents of the University, in their corporate capacity, may take by grant, gift, devise, or bequest, any property for the use of the University, or of any College thereof, or of any professorship, chair, or scholarship therein, or for the library, an observatory, workshops, gardens, greenhouses, apparatus, a Students' Loan Fund, or any other purpose appropriate to the University; and such property shall be taken, received, held, managed, and invested, and the proceeds thereof used, bestowed, and applied by the said Regents, for the purposes, provisions, and conditions prescribed by the respective grant, gift, devise, or bequest;

8. The Regents of the University may invest any of the permanent funds of the University, which are now, or hereafter may be in their custody, in productive unincumbered real estate in this State, subject to the power of the Legislature to control or change such investment, excepting such as by the terms of their acquisition must be otherwise invested;

9. If by the terms of any grant, gift, devise, or bequest, such as are described in the preceding sixth and seventh subdivisions, conditions are imposed which are impracticable under the provisions of the Civil Code, such grant, gift, devise, or bequest shall not thereby fail, but such conditions shall be rejected, and the intent of the donor carried out as near as may be.

ARTICLE III.

UNIVERSITY CONTROLLED BY REGENTS.

SEC. 1425. The University is under the control of a Board of Regents, consisting of twenty-two members; but the President of the University for the time being, shall be a member of the Board of Regents by virtue of his office.

SIXTEEN REGENTS APPOINTED BY THE GOVERNOR.

SEC. 1426. Sixteen members of the Board are appointed by the Governor, with the advice and consent of the Senate. Their term of office is sixteen years.

APPOINTMENT OF SIX OTHER REGENTS.

SEC. 1427. Six members of the Board hold by virtue of other offices, as provided in section three hundred and fifty-three.*

VACANCIES.

SEC. 1428. Whenever a vacancy occurs in the Board, the Governor must appoint some person to fill it, and the person so appointed holds for the remainder of the term.

PRESIDENT OF THE BOARD.

SEC. 1429. The Governor is President of the Board.

QUORUM.

SEC. 1430. Seven members constitute a quorum of the Board.

REGENTS RECEIVE NO COMPENSATION.

SEC. 1431. The members receive no compensation.

GENERAL POWERS AND DUTIES OF REGENTS.

SEC. 1432. The powers and duties of the Board of Regents are as follows:

1. To meet at such times and places as their rules may prescribe, or at the call of the President of the Board;
2. To control and manage the University and its property;
3. To prescribe rules for their own government and for the government of the University;

*Section 353 provides that the Governor, Lieutenant-Governor, Speaker of the Assembly, Superintendent of Public Instruction, President of the State Board of Agriculture, and President of the Mechanics' Institute of San Francisco, are ex officio Regents of the University of California.

4. To adopt and prescribe rules for the government and discipline of the Cadets;

5. To receive, in the name of the State, or of the Board of Regents, as the case may be, all property donated to the University;

6. To choose a President of the University, the Professors, and other officers and employes of the University, prescribe their duties, fix and provide for the payment of their salaries;

7. To fix the qualifications for admission to the benefits of the University;

8. To fix the admission fee and rates of tuition;

9. To appoint a Secretary and Treasurer, prescribe their duties, and fix and provide for the payment of their compensation;

10. To remove at pleasure any officer, professor, or employé of the University;

11. To supervise the general courses of instruction, and, on the recommendation of the several Faculties, prescribe the authorities and text-books to be used in the several Colleges;

12. To confer such degrees and grant such diplomas as are usual in Universities, or as they deem appropriate;

13. To establish and maintain a museum;

14. To establish and maintain a library;

15. To take immediate measures for the permanent improvement and planting of the University grounds;

16. To keep a record of all their proceedings;

17. Through the President of the University, to report to the Governor the progress, condition, and wants of each of the Colleges embraced in the University; the course of study in each; the number of Professors and students; the amount of receipts and disbursements, together with the nature, cost, and results of all important investigations and experiments, and such other information as they may deem important.

INCOME ARISING FROM ENDOWMENT AT DISPOSITION OF REGENTS.

SEC. 1433. The entire income arising from the endowment is subject to the trusts at the disposition of the Board of Regents, for the support of the University.

FUNDS TO BE SET APART FOR CURRENT EXPENSES.

SEC. 1434. For the current expenditures of the University, specific sums of money must be set aside, out of the funds at their disposal, by the Board of Regents, which are subject to the warrants of the President of the Board, drawn upon the Treasurer of the University in pursuance of the order of the Board of Regents.

FUNDS MAY BE DRAWN FROM STATE TREASURY.

SEC. 1435. All moneys which may at any time be in the State treasury,

subject to the use of the Board of Regents, may be drawn therefrom by the President of the Board, upon the order of the Board in favor of the Treasurer of the University.

CONSTRUCTION OF BUILDINGS.

SEC. 1436. The Regents must cause to be constructed such buildings as are needed for the use of the University.

SEC. 1437. The plan adopted in the construction of buildings must provide separate buildings for separate uses, and so group all such buildings that a central building may bring the whole in harmony as part of one design.

SEC. 1438. The construction and furnishing of the buildings must be let out to the lowest responsible bidder, after advertisement for not less than ten days, in at least two daily newspapers published in the City of San Francisco ; but the Regents may reject any bid, and advertise anew.

TEMPORARY BUILDINGS.

SEC. 1439. Until the University buildings are ready for use, the Regents may make any temporary arrangements for buildings at Oakland.

ARTICLE IV.

QUALIFICATIONS AND CHOICE OF SECRETARY.

SEC. 1449. A practical agriculturist, competent to superintend the working of the agricultural farm and to discharge the duties of Secretary of the Board of Regents, must be chosen by the Board as their Secretary.

RESIDENCE AND DUTIES OF SECRETARY.

SEC. 1450. The Secretary must :

1. Reside and keep his office at the seat of the University ;
2. Keep a record of the transactions of the Board of Regents, which must be open at all times to the inspection of any citizen of this State ;
3. Have the custody of all books, papers, documents, and other property which may be deposited in his office ;
4. Keep and file all reports and communications which may be made to the University appertaining to education, science, art, husbandry, mechanics, or mining ;
5. Address circulars to societies and others, soliciting information upon the latest and best modes of culture of the products adapted to the soil and climate of the State, and on all subjects connected with field culture, horticulture, stock-raising, and the dairy ;
6. Correspond with established schools of mining and metallurgy in Europe, and obtain information respecting the improvements of mining machinery adapted to California ;

7. Correspond with the Patent Office at Washington, and with the representatives of the Government of the United States abroad, to procure contributions to agriculture from these sources; receive and distribute seeds, plants, shrubbery, and trees adapted to our climate and soils, for the purposes of experiment;

8. Obtain contributions to the museums and the library of the University;

9. Keep a correct account of all the executive acts of the President of the University;

10. Keep an accurate account of all moneys received into the treasury or paid therefrom;

11. Distribute the seeds, plants, trees, and shrubbery received by him, and not needed by the University, equally throughout the State, to farmers and others who will agree to cultivate them properly, and return to the Secretary's office a reasonable proportion of the products thereof, with a statement of the mode of cultivation, and such other information as may be necessary to ascertain their value for cultivation in the State;

12. Publish from time to time in the newspapers of the State, free of charge, information relating to agriculture, the mechanic arts, mining, and metallurgy.

TERM AND COMPENSATION.

SEC. 1451. The Secretary holds office at the pleasure of and receives the compensation fixed by the Board.

ARTICLE V.

ACADEMIC SENATE.

SEC. 1461. The Academic Senate is composed of the Faculties and Instructors of the University.

GENERAL POWERS.

SEC. 1462. The Senate must conduct the general administration of the University, regulate the general and special courses of instruction, receive and determine all appeals from acts of discipline enforced by the Faculty of any College, and exercise such other powers as the Board of Regents may confer upon it.

PROCEEDINGS.

SEC. 1463. Its proceedings must be conducted according to rules of order adopted by it, and every person engaged in instruction in the University may participate in its discussions; but the right of voting is confined to the President and Professors.

ARTICLE VI.

UNIVERSITY CADETS.

SEC. 1473. The students of the University must be organized into a body known as the "University Cadets."

OFFICERS.

SEC. 1474. The officers of Cadets, between and including the ranks of Second Lieutenant and Colonel, must be selected by the Chief Military Instructor, with the assent of the President of the University, and must be commissioned by the Governor.

EQUIPMENTS.

SEC. 1475. The Adjutant-General of the State must issue such arms, munitions, accoutrements, and equipments to the University Cadets as the Board of Regents may require and the Governor approve.

RETIRED OFFICERS.

SEC. 1476. Upon graduating or retiring from the University, such officers may resign their commissions or hold the same as retired officers of the University Cadets, liable to be called in service by the Governor in case of war, invasion, insurrection, or rebellion.

REPORT OF MILITARY INSTRUCTOR.

SEC. 1477. The Military Instructor must make quarterly reports to the Adjutant-General of the State, showing the number, discipline, and equipments of the Cadets.

THE CONGRESSIONAL LAW.

AN ACT DONATING PUBLIC LANDS TO THE SEVERAL STATES AND TERRITORIES WHICH MAY PROVIDE COLLEGES FOR THE BENEFIT OF AGRICULTURE AND THE MECHANIC ARTS.

SECTION 1. *Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That there be granted to the several States, for the purposes hereinafter mentioned, an amount of public land, to be apportioned to each State, a quantity equal to thirty thousand acres for each Senator and Representative in Congress to which the States are respectively entitled by the apportionment under the census of eighteen hundred and sixty; *provided,* that no mineral lands shall be selected or purchased under the provisions of this Act.

SEC. 2. *And be it further enacted,* That the land aforesaid, after being surveyed, shall be apportioned to the several States in sections, or subdivisions of sections not less than one quarter of a section; and whenever there are public lands in a State subject to sale at private entry at one dollar and twenty-five cents per acre, the quantity to which said State shall be entitled shall be selected from such lands within the limits of such State, and the Secretary of the Interior is hereby directed to issue to each of the States in which there is not the quantity of public lands subject to sale at private entry at one dollar and twenty-five cents per acre, to which said State may be entitled under the provisions of this Act, land scrip to the amount in acres for the deficiency of its distributive share; said scrip to be sold by said States and the proceeds thereof applied to the uses and purposes prescribed in this Act, and for no other use or purpose whatsoever; *provided,* that in no case shall any State to which land scrip may thus be issued be allowed to locate the same within the limits of any other State, or of any Territory of the United States, but their assignees may thus locate said land scrip upon any of the unappropriated lands of the United States subject to sale at private entry at one dollar and twenty-five cents, or less, per acre; *and, provided further,* that not more than one million acres shall be located by such assignees in any one of the States; *and, provided further,* that no such location shall be made before one year from the passage of this Act.

SEC. 3. *And be it further enacted,* That all the expenses of management, superintendence, and taxes from the date of selection of said lands, previous to their sales, and all expenses incurred in the management and disbursement of the money which may be received therefrom, shall be paid by the

States to which they may belong, out of the treasury of said States, so that the entire proceeds of the sale of said lands shall be applied, without any diminution whatever, to the purposes hereinafter mentioned.

SEC. 4. *And be it further enacted*, That all moneys derived from the sale of the lands aforesaid by the States to which the lands are apportioned, and from the sale of land scrip hereinbefore provided for, shall be invested in stock of the United States, or of the States, or some other safe stocks, yielding not less than five per centum upon the par value of said stocks; and that the moneys so invested shall constitute a perpetual fund, the capital of which shall remain forever undiminished (except so far as may be provided in section fifth of this Act), and the interest of which shall be inviolably appropriated, by each State which may take and claim the benefit of this Act, to the endowment, support, and maintenance of at least one College where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the Legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life.

SEC. 5. *And be it further enacted*, That the grant of land and land scrip hereby authorized shall be made on the following conditions, to which, as well as to the provisions hereinbefore contained, the previous assent of the several States shall be signified by legislative Acts :

First—If any portion of the fund invested, as provided by the foregoing section, or any portion of the interest thereon, shall, by any action or contingency, be diminished or lost, it shall be replaced by the State to which it belongs, so that the capital of the fund shall remain forever undiminished; and the annual interest shall be regularly applied without diminution to the purposes mentioned in the fourth section of this Act, except that a sum, not exceeding ten per centum upon the amount received by any State under the provisions of this Act, may be expended for the purchase of lands for sites or experimental farms, whenever authorized by the respective Legislatures of said States.

Second—No portion of said fund, nor the interest thereon, shall be applied, directly or indirectly; under any pretense whatever, to the purchase, erection, preservation, or repair of any building or buildings.

Third—Any State which may take and claim the benefit of the provisions of this Act, shall provide, within five years, at least not less than one College, as described in the fourth section of this Act, or the grant to such State shall cease; and said State shall be bound to pay the United States the amount received of any lands previously sold, and that the title to purchasers under the State shall be valid.

Fourth—An annual report shall be made regarding the progress of each College, recording any improvements and experiments made, with their costs and results, and such other matters, including State industrial and economical statistics, as may be supposed useful, one copy of which shall be transmitted by mail, free, by each to all the other Colleges which may be endowed under the provisions of this Act, and also one copy to the Secretary of the Interior.

Fifth—When lands shall be selected from those which have been raised to double the minimum in price, in consequence of railroad grants, they shall be computed to the States at the maximum price, and the number of acres proportionately diminished.

Sixth—No State, while in a condition of rebellion or insurrection against the Government of the United States, shall be entitled to the benefit of this Act.

Seventh—No State shall be entitled to the benefits of this Act unless it shall express its acceptance thereof, by its Legislature, within two years from the date of its approval by the President.

SEC. 6. *And be it further enacted*, That land scrip issued under the provisions of this Act shall not be subject to location until after the first day of January, one thousand eight hundred and sixty-three.

SEC. 7. *And be it further enacted*, That the land officers shall receive the same fees for locating land scrip issued under the provisions of this Act, as is now allowed for the location of military bounty land warrants under existing laws; *provided*, their maximum compensation shall not be thereby increased.

SEC. 8. *And be it further enacted*, That the Governors of the several States to which scrip shall be issued under this Act, shall be required to report annually to Congress all sales made of such scrip, until the whole amount shall be disposed of, the amount received for the same, and what appropriation has been made of the proceeds.

Approved July 2d, 1862.

CONSTITUTION OF CALIFORNIA, 1863.

ARTICLE IX.

SECTION 4. The Legislature shall take measures for the protection, improvement, or other disposition of such lands as have been or may hereafter be reserved or granted by the United States, or any person or persons, to the State, for the use of a University; and the funds accruing from the rents or sale of such lands, or from any other source, for the purpose aforesaid, shall be and remain a permanent fund, the interest of which shall be applied to the support of said University, with such branches as the public convenience may demand, for the promotion of literature, the arts and sciences, as may be authorized by the terms of such grant. And it shall be the duty of the Legislature, as soon as may be, to provide effectual means for the improvement and permanent security of the funds of said University.

CONSTITUTION OF CALIFORNIA, 1879.

ARTICLE IX.

SECTION 9. The University of California shall constitute a public trust, and its organization and government shall be perpetually continued in the form and character prescribed by the organic Act creating the same, passed March twenty-third, eighteen hundred and sixty-eight (and the several Acts amendatory thereof), subject only to such legislative control to insure compliance with the terms of its endowments and the proper investment and security of its funds. It shall be entirely independent of all political or sectarian influence, and kept free therefrom in the appointment of its Regents, and in the administration of its affairs; *provided*, that all moneys derived from the sale of public lands donated to this State by Act of Congress, approved July second, eighteen hundred and sixty-two (and the several Acts amendatory thereof), shall be invested as provided by said Acts of Congress, and the interest of said moneys shall be inviolably appropriated to the endowment, support, and maintenance of at least one College of Agriculture, where the leading objects shall be (without excluding other scientific and classical studies, and including military tactics) to teach such branches of learning as are related to scientific and practical agriculture and the mechanic arts, in accordance with the requirements and conditions of said Acts of Congress; and the Legislature shall provide that if, through neglect, or any other contingency, any portion of the funds so set apart shall be diminished or lost, the State shall replace such portion so lost or misappropriated, so that the principal thereof shall remain forever undiminished. No person shall be debarred admission to any of the collegiate departments of the University on account of sex.



Professional Colleges.



A

Department of Law.

LECTURE HALL:

Assembly Room of the Academy of Sciences, southwest corner of California and Dupont Streets, San Francisco.

OFFICE OF DEAN AND REGISTRAR:

Room 2, Court Block, 636 Clay Street, San Francisco.



Hastings College of the Law.

DIRECTORS.

HON. WM. T. WALLACE.....SAN FRANCISCO.

Chief Justice, President of Board.

COLONEL J. P. HOGE.....SAN FRANCISCO.

Vice-President.

HON. W. W. COPE.....SAN FRANCISCO.

HON. DELOS LAKE.....SAN FRANCISCO.

HON. J. R. SHARPSTEIN.....SAN FRANCISCO.

HON. O. P. EVANS.....SAN FRANCISCO.

S. M. WILSON, Esq.....SAN FRANCISCO.

THOMAS B. BISHOP, Esq.....SAN FRANCISCO.

THOMAS I. BERGIN, Esq.....SAN FRANCISCO.

Hastings College of the Law.

FACULTY.

JOHN LECONTE, LL. D.,
President.

JOHN NORTON POMEROY, LL. D.,
Professor of Municipal Law.

WM. H. PLATT, D. D., LL. D.,
Professor of Ethics and Rules of Morality.

S. CLINTON HASTINGS,
Dean.

CHARLES P. HASTINGS, B. S.,
Registrar.

Students.

MIDDLE CLASS.

NAME.	RESIDENCE.
John Q. Adams	San Francisco.
Charles S. Andrews, A. B. (Bdn.)	San Francisco.
Charles R. Barry, B. S. (S. C.)	San Francisco.
E. S. Belknap	San Francisco.
A. F. Benjamin	San Francisco.
D. L. Bishop	Lower Lake.
J. I. Boland	San Francisco.
C. K. Bonestell, A. B. (U. C.)	San Francisco.
A. C. Bradford, Jr., Ph. B. (U. C.)	San Francisco.
E. R. Brooks	San Francisco.
Earnest Brand	San Francisco.
V. P. Buckley	San Francisco.
William C. Burke	Berkeley.
L. W. Cheney, Ph. B. (U. C.)	Berkeley.
Joseph F. Coffey	San Francisco.
Patrick Cummins	San Francisco.
Wallace O. Currier	San Francisco.
W. R. Daingerfield, A. B. (U. C.)	San Francisco.
A. B. D'Ancona, A. B. (U. C.)	San Francisco.
John D'Arcy	San Francisco.
Frank P. Deering, A. B., A. M., (U. C.)	San Francisco.
J. H. Deering, Jr.	San Francisco.
J. B. de las Casas	Oakland.
Louis F. Dunand	San Francisco.
Peter F. Dunne	San Francisco.
James D. Elms	Berkeley.
E. W. Emerson	San Francisco.
J. T. Fleming	San Francisco.
T. F. Graber	Berkeley.
Theodore Gray, A. B. (U. C.)	San Francisco.
Robert P. Hastings, A. B. (H. U.)	San Francisco.
E. W. Hawley	San Francisco.
Alexander Heynemann	San Francisco.
James E. Hughes	San Francisco.

NAME.	RESIDENCE.
James A. Hall	Watsonville.
Samuel Irving, A. B. (U. C.)	Berkeley.
J. Walter Knox	Merced.
E. J. Linforth	San Francisco.
John M. Lucas	San Francisco.
Fiesco Mandlebaum, A. B. (U. C.)	San Francisco.
F. C. Marshall	San Francisco.
D. B. Marx, Ph. B. (U. C.)	San Francisco.
E. J. McCutchen	San Francisco.
E. W. McNally	San Francisco.
Henry C. McPike	Napa City.
G. H. Mastick	San Francisco.
George D. Metcalf	Oakland.
Leslie F. Miller	San Francisco.
A. F. Morrison, A. B. (U. C.)	San Francisco.
Edward M. Mott	San Francisco.
Charles H. Moore	San Francisco.
Anthony Morganthal	San Francisco.
H. S. Mulford	San Francisco.
James E. Nagle	San Francisco.
F. M. Ostrander	Merced.
C. P. Pomeroy	San Francisco.
Martin Quinlin, B. S. (S. M.)	Bodega Corners.
F. Wm. Reade	San Francisco.
S. H. Regensberg	San Francisco.
John W. Ryland	San José.
Alfred Sayre	San Francisco.
William T. Sesnon	San Francisco.
Charles S. Silliman	San Francisco.
David Simon	San Francisco.
F. J. Solinsky, Ph. B. (U. C.)	San Francisco.
Edward M. Seaman	San Francisco.
H. J. Stafford	San Francisco.
Wm. F. Stafford	San Francisco.
F. S. Stratton	Oakland.
Edwin Swinford	San Francisco.
Matthew I. Sullivan, B. S. (St. I.)	San Francisco.
Gaston Straus	San José.
G. C. Sargent	San Francisco.
Calvin F. Summers	San Francisco.
L. P. Tidball	San Francisco.

NAME.	RESIDENCE.
C. L. Tilden	San Francisco.
Alfred Tobin	San Francisco.
T. O. Toland, A. B. (U. C.)	San Francisco.
Albert V. Touchard	Oakland.
Gustave Touchard, Jr.	Oakland.
F. P. Tuttle	Oakland.
H. D. Tuttle	San Francisco.
W. M. Van Dyke, A. B. (U. C.)	San Francisco.
Charles Von Lowenfels	San Francisco.
Ryland B. Wallace, A. B. (U. C.)	San Francisco.
Adair Welker	Berkeley.
G. A. Whitby	Berkeley.
F. R. Whitcomb, A. B. (U. C.)	Berkeley.
J. W. Winans, Jr., A. B. (U. C.)	San Francisco.
Ralph Wood	Oakland.
Geo. T. Wright, A. B. (U. C.)	San Francisco.
E. B. Young	San Francisco.
George A. Young	San Francisco.
Total	93.

JUNIOR CLASS.

NAME.	RESIDENCE.
Frank M. Angellotti	San Rafael.
R. P. Ashe	San Francisco.
Robert B. Brenham, A. B., (S. C.)	San Francisco.
Joseph F. Cavagnaro, M. S., (S. C.)	San Francisco.
Henry Bordé	San José.
A. Caminetti	Jackson.
John D. Connolly	San Francisco.
S. E. Crow	San Francisco.
E. B. Cutler	San Francisco.
Carroll M. Davis, A. B., (U. C.)	Berkeley.
Henry C. Downing	Wilmington.
Henry Davis	San Francisco.
Herman A. Druhé	San Francisco.
Charles H. Foote	Lockeford.
George Flournoy, Jr.	San Francisco.
Jacob Galland	San Francisco.
S. J. Garibaldi	San Francisco.

NAME.	RESIDENCE.
Richard Gerke	San Francisco.
Maurice Gradwohl	San Francisco.
Jacob Hoeck	Berkeley.
P. J. Healey	San Francisco.
Henry C. Hinckle	San Francisco.
Joseph Hutchinson, Ph. B., (U. C.)	San Francisco.
Howard R. Johnson	San Quentin.
Walter N. Kempston	San Francisco.
Albert Kaplan	San Francisco.
William Knox	San Francisco.
William W. Knott	San Francisco.
William D. Lawton	Oakland.
E. W. Levy	San Francisco.
Max Loewenthal	Sacramento.
George Luce	San Francisco.
John W. Lewis	Red Bluff.
Henry McCrea	San Rafael.
V. C. McMurray, Jr.	Camptonville.
Dwight M. McCauley	San Francisco.
Frank D. Miller	San Francisco.
Lansing Mizner, Ph. B., (U. C.)	Benicia.
Benjamin F. Moore	San Francisco.
O. F. Meldon	San Francisco.
M. F. O'Donoghue	San Francisco.
H. M. Savage, Ph. B., (U. C.)	San Francisco.
William Schmidt	Alameda.
Leander Shores	San Francisco.
C. A. Shurtleff	Napa City.
J. Angelo Spinetti	San Francisco.
William H. Schooler	San Francisco.
W. S. Stone	San Francisco.
C. A. Stonesifer	Hill's Ferry.
George F. Schorr	Gridley.
Farren Stranahan	San Francisco.
James F. Smith, M. A., (S. C.)	San Francisco.
Robert B. Tappen	Alameda.
R. B. Terry	Stockton.
B. G. Thomas	San Francisco.
Samuel Tevis	San Francisco.
E. B. Thompson	San Francisco.
N. M. Trezevant, A. B., (Y.)	San Francisco.

E. H. Wakeman	San Francisco.
C. A. Webb	Sonoma.
John H. Wheeler, Ph. B., (U. C.)	Saint Helena.
F. P. Wickersham	Petaluma.
Harry T. Williams	San Francisco.
E. B. Williams, B. S., (U. M. C.)	University Mound College.
M. S. Wilson, A. B., (Y.)	San Francisco.
George L. Wilson	Alameda.
Total	66.
Middle Class	93
Junior Class	66
Total	159

* ABBREVIATIONS IN COLLEGE TITLES.

U. C.—University of California.	St. M.—St. Mary's College.
H. U.—Harvard University.	St. I.—St. Ignatius College.
Y.—Yale College.	U. M. C.—University Mound College.
S. C.—Santa Clara College, California.	Bdn.—Bowdoin College, Maine.



HASTINGS COLLEGE OF THE LAW.

GENERAL STATEMENTS.

During the present College year (1879-80) Professor J. N. Pomeroy will deliver two lectures daily at the Assembly Room of the Academy of Sciences, southwest corner of California and Dupont Streets.

The Middle Class lecture at 4 p. m.

The Junior Class Lecture at 12:30 p. m.

Moot Courts will be held Saturdays.

ADMISSION OF STUDENTS, ETC.

1. Students will be admitted to either class and fully matriculated only upon furnishing a satisfactory certificate of their good moral character, and paying to the Registrar the sum of ten dollars as a matriculation fee. Applicants for admission to the first or Junior Class must also satisfy the authorities of the institution that they possess sufficient knowledge and culture to enable them to profit by the course of study. Students applying for admission to the Middle or Senior Class must also pass a satisfactory examination in the studies of the preceding year or years, as the case may be.

2. Gentlemen who do not reside in San Francisco, or its immediate vicinity, and who are desirous of availing themselves of the course of study as *non-resident* students, may at any time file their application to be admitted, upon furnishing a certificate of good moral character, and paying the fee of ten dollars. They will then be entitled to attend as many of the lectures, exercises, and examinations as they may desire, but they will not be considered as fully matriculated students of the Middle year until they shall have satisfactorily passed the examinations preliminary to entering upon the proposed advanced class, and are enrolled as actual members of such class in regular attendance.

3. No student shall be entitled to graduate and to receive the diploma from the University unless he shall have been an actual member of the Senior Class, in regular attendance upon its exercises.

CLASSES AND THE ACADEMIC YEAR.

1. The entire course of instruction extends through three academic years, and the school is separated into three classes corresponding to these three years, known respectively as the Junior, Middle, and Senior. The course of instruction in each class occupies one academic year.

2. The academic year is the same as that of the University of California, with the usual holiday recess.

EXAMINATIONS, PROMOTIONS, AND GRADUATION.

1. There will be a regular examination at the close of the Junior and of the Middle year, preliminary to promotion into the next higher class. There will also be a regular examination upon all the studies of the course at the close of the Senior year, preliminary to graduation. These examinations will be either wholly in writing, or partly in writing and partly oral, at the discretion of the Professor of Municipal Law. There will also be intermediate examinations of each class at such times and in such manner as the Professor of Municipal Law shall direct.

2. Members of each of the two lower classes, upon satisfactorily passing the regular examinations at the close of their respective years mentioned above, will be promoted into and become members of the next higher class. Upon being thus promoted into and becoming a member of each higher class, every student will be required to pay to the Registrar the fee of ten dollars, for the purpose of defraying incidental class expenses.

ATTENDANCE, CONDUCT, ETC.

The proficiency and attainments of each student, and his right to promotion and to graduation, are tested by his examinations, taken in connection with the personal knowledge of his character and the knowledge obtained by the Faculty from the intercourse of the class-room.

It is expected that matriculated students will regularly attend the stated exercises of school.

During their presence in the class-room, and in their intercourse with the Faculty and other officers of the institution, the students are expected and required to adopt and conform to the conduct, principles, and manners of gentlemen.

The authorities will exercise the right of removing any student guilty of any immoral conduct rendering him unfit for the society of gentlemen.

COURSE OF STUDY.

JUNIOR YEAR.

In the first or Junior year, the class will go over the fundamental or general principles and doctrines which constitute the framework of our jurisprudence in all of its most important departments of primary or substantive rights and duties—embracing the law as to persons and personal rights; the law as to personal property; an outline of the law as to contracts, and the law as to real property, with the exception of trusts, powers, and remainders.

The instruction during the year will be given by means of particular text-books, definite portions being assigned for preliminary examination by the class, with an oral exercise, discussion, or lecture upon such lessons, conducted by the Professor in charge. Reference will constantly be made to the statutory legislation of California and of other States, so far as may be found necessary, and also to leading judicial decisions involving the subject under consideration.

In addition to the special text-books used, the class will be recommended to read, in connection with each topic or head of the law under examination, other works in which the subject is more fully treated. It is not expected that each student will read all of these treatises thus indicated for collateral study, or even the whole of any treatise. A list is given from which the members of the class may select, according to their opportunities and the time at their disposal.

REQUIRED COURSE WITH THE TEXT-BOOKS.—1. *The Law as to Persons*, including the personal rights of life, limb, liberty, and reputation; citizens, voters, and aliens; the domestic relations, marriage, divorce, husband and wife, parent and child, infants, guardian and ward, master and servant, etc. Kent's Commentaries, Lectures 24 to 32 inclusive.

2. *The Law as to Personal Property*, its nature, kind, mode of acquisition, and transfer. Kent's Commentaries, Lectures 34 to 38 inclusive.

3. *Outline of the Law as to Contracts*, including the general doctrines which apply to all contracts. Metcalf on Contracts, and Parsons on Contracts, Vol. I, Book 1, chapters 1 and 2; Book 2, chapters 1 and 2; Vol. II, Part 2, chapters 1, 2, 3, 4, 6, 8, and 9.

4. *The Law as to Real Property*, including all its branches, except uses and trusts, powers, and future contingent estates. Blackstone's Commentaries, Book 2, chapters 1 to 20 inclusive; Washburne on Real Property, Vol. I, chapters 5 to 13 inclusive; Vol. II, chapters 14, 15, and 16; Book 2, chapter 1; Vol. III, Book 3, chapters 1 to 4 inclusive.

OPTIONAL COURSE OF COLLATERAL READING.—*History and Development of the Law and its Sources*.—Pomeroy's Introduction to Municipal Law.

Personal Rights of life, body, limb, liberty, and reputation, and the torts or wrongs by which they may be violated. See the titles, "Assault and Battery," "False Imprisonment," "Malicious or Wrongful Arrest," "Malicious Prosecution," "Slander," "Libel," and the like, in Bigelow on Torts; Addison on Torts, chapters 12 to 17; Hilliard on Torts, chapters 5 to 16; Waterman on Trespass, Book 2, chapters 1 and 2; Bigelow's Leading Cases on Torts, titles: "Assault and Battery," "False Imprisonment," "Malicious Prosecution," "Deceit."

Slander and Libel.—See Townshend on Slander and Libel; Starkie on ditto; Smith's Leading Cases, titles: Libel, Slander, Damages; American Leading Cases, same titles; Bigelow's Leading Cases on Torts, same titles.

Marriage and Divorce.—See Bishop on Marriage and Divorce; Schouler's Domestic Relations.

Husband and Wife, Parent and Child, Infants, etc.—See Schouler's Domestic Relations; Reeves' Domestic Relations; Bingham on Infancy; Parsons on Contracts, Vol. I, chapter 17, on Infants; Bishop on Married Women's Property; Smith's Leading Cases; case of *Manby v. Scott*, on Husband's Liability for Wife's Contracts; American Leading Cases, title Infancy.

Personal Property.—See Williams on Personal Property; Belknap on Probate.

Contracts.—See Langdell's Select Cases on Contracts, and portions of Smith, Chitty, Story, or Addison, on Contracts.

Real Property.—See Smith's Leading Cases; case of *Elves v. Mawes* on Fixtures; Williams on Real Property; Kent's Commentaries, Lectures on Real Property; Washburne on Easements, and Jones on Mortgages.

MIDDLE YEAR.

In the second or middle year the class is no longer confined to particular text-books, nor definite lessons. In commencing each important subject (*e. g.* Corporations, or Agency, etc.) the class will be furnished with a printed syllabus of the lectures to be given on that topic. This syllabus states in outline the matters to be discussed in each lecture, and the various text-books and treatises, with a reference to the chapters or sections, where the questions are treated. It also gives the "leading cases," English and American, and also cites the subsequent most important decisions in which the principles have been explained, extended, limited, or applied. The class is expected to study by the direction of this syllabus, to read some one or more of the text-books referred to, and especially to study the judicial decisions which are cited. The class will thus be prepared for the oral examination and discussion by the Professor in charge, which are based

upon the outline contained in the syllabus. As each syllabus will mention all the standard writers who may be profitably consulted by the class, in connection with each topic, no list of works for collateral reading is here given. The Statutes of the State are constantly referred to and studied.

The course of study embraces a full treatment of mercantile and commercial law, corporations, agency, partnership, sale, bailments, bills and notes, insurance, shipping contracts, suretyship, etc., certain heads of real property law, viz.: Remainders, executory devises, trusts and powers; last wills and testaments, and the administration of the estates of deceased persons; equity jurisprudence, and torts.

SENIOR YEAR.

In the third or senior year the course of study contemplates two distinct objects: First, the practical application of the substantive doctrines of the law, which have been studied during the former two years; and, second, the giving to the class a more complete and perfect acquaintance with all the departments of jurisprudence than it is possible to do within a period limited to two academic years.

In accomplishing the first of these objects, those branches will be pursued which constitute the remedial portion of the law.

It includes pleading and practice, according to the reformed system of procedure, together with the general theory of common law forms of action, and of common law and equity pleading, and the law of evidence.

The text-books, to which attention will be particularly directed, are Pomeroy's Remedies and Remedial Rights; Pleading and Practice under the California Code of Procedure; Stephens on Pleading; Gould on Pleading; Lubé Equity Pleading; Greenleaf on Evidence; Wharton on Evidence.

The second general object will be accomplished by instruction in the following subjects: Constitutional law of the United States and the State; International Law, public and private; Medical Jurisprudence; Roman Law and General Jurisprudence; the Principals of Morality in their application to the Law and to its Practice; Criminal Law; and, it is hoped, Admiralty Law, and Patent Law.

MOOT COURT.

A Moot Court will be established, as a regular mode of instruction, for the argument of causes and the discussion of legal questions by members of all the classes.

ACT OF THE LEGISLATURE

ESTABLISHING

HASTINGS COLLEGE OF THE LAW

[Approved March 28, 1878.]

AN ACT TO ESTABLISH HASTINGS COLLEGE OF THE LAW IN CALIFORNIA.

SECTION 1. That S. C. Hastings be authorized to found and establish a Law College, to be forever known and designated as "Hastings College of the Law."

That the officers of said College shall be a Dean, Registrar, and eight Directors. That the Directors shall be Joseph P. Hoge, W. W. Cope, Delos Lake, Samuel M. Wilson, O. P. Evans, Thomas B. Bishop, John R. Sharpstein, Thomas I. Bergin, of the Bar Association of the City of San Francisco, who shall, when vacancies occur, fill the same from members of said Association or otherwise, and shall always provide for filling a vacancy with some heir or some representative of the said S. C. Hastings.

That the Dean and Registrar shall be appointed by the Directors.

SEC. 2. Said College shall affiliate with the University of the State upon such terms as shall be for the welfare of the College and University, and shall be the Law Department of the University.

SEC. 3. The Faculty of the University shall grant diplomas to the students of the College, and the President shall sign and issue the diplomas.

SEC. 4. There shall be set apart for the use of the students of the College, some room or suitable hall at the University; and the Board of Supervisors of the City of San Francisco is authorized to supply a suitable hall in the City of San Francisco for the students and Directors.

SEC. 5. The Dean of said College shall be *ex officio* one of the Faculty of the University, to be designated as such by the Directors of the College.

SEC. 6. The diploma of the students shall entitle the student to whom it is issued to a license to practice in all the Courts of this State, subject to right of the Chief Justice of the State to order an examination, as in ordinary cases of applicants without such diploma.

SEC. 7. This Act is passed upon the condition that said S. C. Hastings shall pay into the State treasury the sum of one hundred thousand dollars, and is never to be refunded, except as hereinafter provided.

SEC. 8. The sum of seven per cent. per annum upon one hundred thousand dollars is to be appropriated by the State and paid in two semi-annual payments to the Directors of the College.

SEC. 9. The business of the College shall be to afford facilities for the acquisition of legal learning in all branches of the law; and to this end shall establish a curriculum of studies, and shall matriculate students who may reside at the University of the State, as well as students residing in other parts of the State.

SEC. 10. Professorships may be established in the name of any founder of such Professorships who shall pay to the Directors the sum of thirty thousand dollars.

SEC. 11. All the business of the College shall be managed by the Directors without compensation. And all officers acting, including the Dean and Registrar, shall be appointed by the Directors and removed by them.

SEC. 12. The Law Library Association of the City of San Francisco shall grant to the students the use of their library upon such terms and conditions as they may agree with the Directors of the College.

SEC. 13. The object of this Act being to grant a perpetual annuity for the support and maintenance of said College, should the State or any government which shall succeed it fail to pay to the Directors of said College the sum of seven per cent. per annum as above stipulated, or should the College cease to exist, then the State or its successor shall pay to the said S. C. Hastings, his heirs or legal representatives, the sum of one hundred thousand dollars, and all unexpended accumulated interest; *provided*, that such failure be not caused by mistake or accident, or omission of the Legislature to make the appropriation at any one session.

SEC. 14. That the Chief Justice of the Supreme Court of the State, or if there be no such officer of that name, the chief judicial officer of the State or government, shall be the President of the Board of Directors, five of whom shall be a quorum to transact all business.

CONDITIONS OF AFFILIATION.

At a meeting of the Board of Regents, held August 7th, 1879, the following conditions of affiliation of the Hastings College of the Law with the University were adopted :

Resolved, That the institution known as the Hastings College of the Law shall be affiliated with the University of California and made an integral part of the same, and incorporated therewith, upon the following terms and conditions, which are hereby made a part of such affiliation and incorporation :

First—The Directors of said College, named in the Act of Legislature which organized it, approved March 28th, 1878, shall have authority to fill vacancies in their Board when the same occur, as prescribed in the said Act, subject to the approval of the Board of Regents of said University, except in so far as qualified by the next section.

Second—Honorable S. Clinton Hastings, as founder of said College, and his legal representatives, shall always be entitled to have the appointment from his heirs or representatives of one of said Directors, without such appointment being subject to the approval of the said Board of Regents.

Third—The Faculty of said College shall have the authority to present to the said Board of Regents the names of such students of said College as they recommend for diplomas, and the said Board of Regents shall issue diplomas to said students, subject to the right of said Regents to refuse the same for cause:

Fourth—As soon as practicable, there shall be set apart for the use of the students of said College some room or suitable hall at the University.

Fifth—The present Dean of said College, the Honorable S. Clinton Hastings, shall during his lifetime have a seat in the Academic Senate of said University, be a member thereof, and have a vote therein.

Sixth—The said College shall be subject to the dominion of the said Board of Regents in all matters pertaining to its management and welfare.

Seventh—The number and duties of the Professors of said College shall be prescribed and the business of said College managed by said Board of Directors, subject to the approval of said Board of Regents.



B.

Department of Medicine.



College of Medicine.

* FACULTY.

JOHN LeCONTE, M. D.-----PRESIDENT.

H. H. TOLAND, M. D., *Professor of the Principles of Surgery and Clinical Surgery.*

R. BEVERLY COLE, A. B., M. D., *Professor of Obstetrics and Clinical Diseases of Women.*

C. M. BATES, M. D., *Professor of Clinical Medicine and Physical Diagnosis.*

M. W. FISH, M. D., *Professor of Physiology.*

JAMES SIMPSON, M. D., *Professor of Materia Medica, Therapeutics and Clinical Medicine.*

F. W. HATCH, A. M., M. D., *Professor of Public Hygiene.*

N. J. MARTINACHE, M. D., *Professor of Ophthalmology and Otology.*

G. A. SHURTLEFF, M. D., *Professor of Mental Diseases and Medical Jurisprudence.*

ROBERT A. McLEAN, M. D., *Professor of Principles of Surgery and Surgical Anatomy.*

A. W. PERRY, M. D., *Professor of Chemistry.*

WILLIAM LEWITT, M. D., *Professor of Anatomy.*

W. F. McNUTT, M. D., F. R. C. S., Edinburg, *Professor of Theory and Practice of Medicine.*

H. FERRER, M. D., *Lecturer on Pathology and Microscopy.*

W. H. MAYS, M. D., *Assistant to the Chair of Obstetrics and Gynecology.*

GEORGE E. REYNOLDS, M. D., *Assistant to the Chair of Clinical Medicine.*

WILLIAM B. LEWITT, M. D., *Demonstrator of Anatomy.*

R. BEVERLY COLE, M. D., *Dean, 518 Sutter Street, San Francisco.*

R. A. McLEAN, *Secretary, 603 Merchant Street, San Francisco.*

Students.

NAME.	RESIDENCE.
Addington, D. M.	Michigan Bar, California.
Bevan, A. D.	Salt Lake City, Utah.
Bates, Walter E.	Oakland, California.
Bettelheim, Felix	San Francisco, California.
Caldwell, H. H.	San José, California.
Dean, A. J.	San Francisco, California.
De Puy, A.	Williams, California.
Downes, George W.	Los Angeles, California.
Evans, C. W.	Modesto, California.
Foulkes, J. F.	Oakland, California.
Foote, Gilbert	Lockford, California.
Gale, Herbert A.	Sacramento, California.
Gilham, G. W.	Island City, Oregon.
Grattan, E. L.	San Francisco, California.
Hopkins, T. T.	San Francisco, California.
Howell, H. H.	Bishop Creek, California.
Hughes, L. J.	San Francisco, California.
Harmon, R.	Oakland, California.
Jewell, J. Grey, M. D.	San Francisco, California.
Johnstone, A.	San Francisco, California.
Kent, L. A.	Roseburg, Oregon.
Long, Seeley F.	Eureka, California.
Le Fever, J. P.	Plumas County, California.
Lord, Franklin F.	San Francisco, California.
Laidlaw, Horace	Oakland, California.
Martin, Richard W.	Oakland, California.
Morgan, F. E.	Santa Cruz, California.
Mueller, Herman	Brooklyn, California.
Moody, Mrs. M. W.	San Francisco, California.
Meyers, R. C.	San Francisco, California.
Olds, W. S.	Walla Walla, Washington Territory.
Pond, H. M.	San Francisco, California.
Robertson, J. W.	San Francisco, California.

NAME.	RESIDENCE.
Sparks, Agnes	San Francisco, California.
Sawyer, Herbert C.	San Francisco, California.
Sabey, L. A.	San Francisco, California.
Shepard, Edwin	Redwood City, California.
Smith, George S.	San Francisco, California.
Smith, Charles J.	Oroville, California.
Sheets, J. H.	Phoenix, Arizona Territory.
Stafford, Henry E.	Natividad, California.
Scott, A. W.	San Francisco, California.
Sellon, Anna French	San Francisco, California.
Tarter, Albert P.	Tehama, California.
Urban, Kurt	Berlin, Prussia.
Van Crumbrugghe, A.	San Francisco, California.
Voigt, W. C.	San Francisco, California.
Williams, W. J. G., A. M.	San Francisco, California.
Young, J. D.	Stockton, California.
Younger, E. A.	San Francisco, California.
Total	50.



ANNOUNCEMENT.

The Medical Department of the University of California is located in the metropolis; the necessary advantages for clinical teaching being only fully found in a large city.

The College building, a large brick and stone edifice, is situated on Stockton Street, North Beach, convenient to the termini of two of the principal car routes. The College, known as Toland Hall, is replete with all the apparatus and appointments required in imparting a thorough medical education.

THE COLLEGIATE YEAR.

THE COLLEGIATE YEAR in this institution is divided into two sessions: a Preliminary Spring Term, and a Regular Summer Session.

THE PRELIMINARY TERM commences February first and ends about the middle of May. During this term subjects are dwelt upon that do not receive their full meed of attention during the Regular term. Clinical lectures proceed at the Hospital and College as during the Regular term. The Chemical Laboratory and Dissecting room are open for practical work. Students are expected to attend this preliminary course, although such attendance is not compulsory.

THE REGULAR TERM commences June first, and ends in the second week of November. During this term all the branches of medicine and surgery are taught, didactically and clinically. Regular clinics are held three days in the week at the City and County Hospital, where the Professors of the practical chairs have charge of wards and possess every advantage for the instruction of students. There is also an active clinic conducted twice a week at the College building, where a large number of patients are examined and treated before the classes. Didactic lectures are given daily by the Professors, and evening recitations are held three times a week.

PLAN OF INSTRUCTION.

The almost paramount importance now assigned to *clinical teaching* has been fully met in the curriculum of this school. While didactic teaching has not been overshadowed or neglected, the Faculty have made strenuous

efforts to secure the most comprehensive clinical facilities the city affords, believing that a proper blending of the two methods of instruction will best insure the end and aim of this institution, viz.: the sending forth of skilled, practical physicians.

The plan pursued by the several clinical professors has for its aim the actual confronting of the student with the phenomena of disease, that the senses of sight, hearing, and touch may be trained to aid in forming a correct diagnosis. The method of imparting and educing knowledge is at once attractive and thorough, consisting of questions and answers on each patient examined, discussions on the plans of treatment proposed, and the examination of new cases by each senior student in rotation, in presence of the class.

HOSPITALS.

The provisions for the pursuit of bedside study are perhaps unsurpassed anywhere. They are briefly as follows:

CITY AND COUNTY HOSPITAL.—This is the largest hospital on the Pacific coast, containing nearly five hundred beds. The Faculty of the Medical Department of the University is well represented in its corps of physicians. Three of the surgical wards are under the charge of Professor Toland, assisted by Professor McLean. Professor Bates conducts the general medical clinic, Professor Martinache the clinic of Ophthalmology, Otology, and Laryngology. Each of these gentlemen holds clinics three times a week. The gynecologist of the hospital, Professor Beverly Cole, holds an obstetrical and gynecological clinic twice a week. Autopsies are made every other day under the direction of Dr. H. Ferrer, who instructs the class in the art of making post mortems, and demonstrates pathological conditions by the aid of the microscope. Surgical operations of the more important kind are performed in the newly erected operating theater, a circular building capable of seating two hundred and fifty students. Operating days, Tuesday and Saturday. The hospital is situated at the junction of Twenty-second Street with Potrero Avenue.

CITY RECEIVING HOSPITAL.—This municipal institution, occupying part of the old City Hall, is the general receiving depot for accidents and casualties occurring on the streets of the city. Upwards of one thousand cases were received during last year. It is under the charge of Dr. C. Black, City Physician, and Dr. C. Stivers, Police Surgeon, the latter an alumnus of this school. These gentlemen courteously permit students to visit the wards daily, to be present at operations, assist at dressings, etc.

SAN FRANCISCO FEMALE HOSPITAL, CLAY STREET.—Dr. Hutchins, Surgeon-in-Chief of this hospital, kindly assigns cases of obstetrics to the senior

students of the school, and assists them as far as possible to gain a knowledge of the conduct and management of child-birth.

COUNTY JAIL AND BRANCH JAIL.—The medical service of these institutions is, through the kindness of Dr. Black, open to the attendance of our students, who will be welcomed by the physicians in their rounds, and the various conditions and treatment explained.

COLLEGE DISPENSARY.

Independent of the clinics at the several hospitals, instructive clinic is given at the College building, the patients being furnished with medicine prepared in the College Dispensary, so that students learn not only how to prescribe medicine, but how to dispense it as well—a matter of great importance to those who design practicing in the country.

The College clinics are held on Monday and Thursday, between the hours of eleven and one, and consist of a Gynecological clinic by Professor Cole and Dr. Mays; a clinic of Diseases of Eye, Ear, and Throat, by Professor Martinache; a General Medical clinic, and a clinic of Diseases of Children by Professor Perry; a Surgical clinic by Professor McLean.

To the students of the Senior Class externe cases are assigned by the directors of each of the clinics, so that the student may be practiced in the duties to devolve upon him when he leaves the College and assumes the obligations and responsibilities of the profession.

The clinics are so arranged as in nowise to interfere with the didactic instruction.

PRACTICAL ANATOMY.

The dissecting-room, provided with every modern convenience, is open all the year for such as are prosecuting the study of practical anatomy. Material is abundant and cheap, and every facility is furnished the student.

DIDACTIC INSTRUCTION.

That part of the educational course which belongs to the lecture-room, known as didactic, is sustained by a corps of medical lecturers of large experience and eminent ability. Lectures, to the number of five or six per diem, are given either in the amphitheater or the large lecture-hall of the College, on days alternating with hospital clinic days.

The professor of *Surgery* devotes to this important chair all the attention it demands, illustrating on the cadaver and by wet and dry preparations the various procedures, abnormal conditions, and operations.

In the department of *Obstetrics* the professor imparts a thorough acquaint-

ance with the conduct of labor, normal and abnormal, the diagnosis symptoms and disorders of the pregnant and puerperal state, and the use of obstetrical instruments. The lectures are illustrated by the manikin, by wet preparations, by colored drawings, and by a large collection of preparations in wax, papier-maché, and leather. Every operation in obstetrics is performed on the female cadaver.

It is the aim of the professor of *Materia Medica* to bring before the class, in a manner readily comprehended, all that is of importance in this department. Recently discovered drugs and plants, particularly those indigenous to our soil, receive especial attention.

The lectures in *Physiology* are illustrated by a very complete series of colored drawings prepared for this purpose. The professor also has at his command the large collection of preparations and drawings of the Scientific Department of the State University at Berkeley.

The course in *Chemistry* is made as practical and instructive as possible. The laboratory is rendered complete by constant additions of apparatus and chemicals.

The professor of *Theory and Practice of Medicine*, fully realizing the importance of this chair to the student, presents a conspectus of the modern aspect of the practice of medicine. Disease, as we now understand and treat it, its etiology, diagnosis, prognosis, and treatment, is the object of the instructor in this department.

The lectures on *Anatomy*, general, special, regional, and surgical, are illustrated by wet and dry preparations and the cadaver. The histology of every tissue is taught, and the relation of organs and structures to each other carefully dwelt upon.

The lectures on *Medical Jurisprudence and Mental Diseases* are by the Superintending Physician of the State Lunatic Asylum. They exhibit the principles of legal medicine and the duties of medical men as experts in Courts of justice, the examination of medico-legal questions, including insanity, suicide, infanticide, legitimacy, poisoning, death, injury from violence, feigned sickness, duties of coroners; together with a thorough course on the various diseases of the mind.

The course on *Public Hygiene* is a most interesting one, covering the whole subject of the duties of individuals and municipalities in the preservation of the public health.

The principles of *Gynecology* receive a share of attention commensurate with the growing importance of this branch of the science. The causes, remote and proximate, of the many forms of uterine disease are considered in detail, and the methods of treatment practically exhibited and explained.

An idea of the course of study pursued in the Medical Department may be gathered from the following schedule, which presents each day's study as conducted during the recent regular term.

SCHEDULE OF STUDIES.

MONDAY.	TUESDAY.	WEDNESDAY.	THURSDAY.	FRIDAY.	SATURDAY.
8 A. M.—Lecture. Prof. McLean.	8 A. M.—Hosp. Clinic. Dr. Ferrer.	8 A. M.—Lecture. Prof. McLean.	8 A. M.—Hosp. Clinic. Dr. Ferrer.	8 A. M.—Lecture. Prof. McLean.	8 A. M.—Hosp. Clinic. Dr. Ferrer.
9 A. M.—Lecture. Prof. McNutt.	9 A. M.—Hosp. Clinic. Prof. Bates.	9 A. M.—Lecture. Prof. McNutt.	9 A. M.—Hosp. Clinic. Prof. Bates.	9 A. M.—Lecture. Prof. McNutt.	9 A. M.—Hosp. Clinic. Prof. Bates.
10 A. M.—Lecture. Prof. Cole.	10 A. M.—Hosp. Clinic. Prof. Martinache.	10 A. M.—Lecture. Prof. Cole.	10 A. M.—Hosp. Clinic. Prof. Cole.	10 A. M.—Lecture. Prof. Cole.	10 A. M.—Hosp. Clinic. Prof. Martinache.
11 A. M.—Lecture. Prof. Simpson.	11 A. M.—Hosp. Clinic. Prof. Toland.	11 A. M.—Lecture. Prof. Simpson.	11 A. M.—Hosp. Clinic. Prof. Toland.	11 A. M.—Lecture Prof. Simpson.	11 A. M.—Hosp. Clinic. Prof. Toland.
1:30 P. M.—Coll'ge Clinic. Dr. Mays.			1:30 P. M.—Coll'ge Clinic. Dr. Mays.		
2 P. M.—College Clinic. Profs. Perry and McLean.	2 P. M.—Laboratory Work.	2 P. M.—Lecture. Prof. Shurtleff.	2 P. M.—College Clinic. Profs. Perry and McLean.	2 P. M.—Lecture. Prof. Hatch.	
3 P. M.—Lecture. Prof. Fish.	3 P. M.—Lecture. Prof. Perry.	3 P. M.—Lecture. Prof. Fish.	3 P. M.—Lecture. Prof. Perry.	3 P. M.—Lecture. Prof. Fish.	
4 P. M.—Lecture. Prof. Lewitt.		4 P. M.—Lecture. Prof. Lewitt.		4 P. M.—Lecture Prof. Lewitt.	
7 P. M.—Recitation. Prof. Lewitt.		7 P. M.—Recitation. Prof. McLean.			7 P. M.—Recitation. Prof. McNutt.

THE HIGHER STANDARD OF EDUCATION.

The question of establishing a higher standard of requirements for graduation has for some years occupied a prominent place in the thoughts of all interested in medical education. It is with pride that it can be said that the Medical Department of this University was among the first schools of America to adopt an improved and higher system of study and requirements. A three-years' course of regular medical study is an indispensable qualification for graduation. No student can present himself for final examination until he has attended faithfully three regular courses of lectures and clinics. While this requirement entails no extra expense in the matter of fees, it is a still further guarantee that none shall bear the diploma of the State Medical School but those thoroughly qualified.

The system of GRADED STUDIES and YEARLY EXAMINATIONS has also been introduced, in uniformity with the Howard plan, and now generally adopted by the higher class of eastern medical colleges. The studies are so graded as to allow the constant introduction of new matter as the student progresses, and at the same time to secure at least as much repetition of the more essential subjects as in the former system of teaching.

An examination is held at the close of each regular term on the advancement made by the student in the branches assigned. The final or graduation examination, however, comprises the whole field of medicine. The union of clinical with didactic teaching, a leading principle of this school, is not interfered with in the working of this plan.

The subjects for examination are apportioned as follows :

FIRST YEAR.

Anatomy, Physiology, General Chemistry, and Materia Medica.

SECOND YEAR.

Anatomy, Physiology, Medical Chemistry, Materia Medica, Pathological Anatomy and Histology, Clinical Medicine, Physical Diagnosis, and Clinical Surgery.

THIRD YEAR.

Anatomy, General and Surgical, Physiology, Chemistry, Materia Medica and Therapeutics, Obstetrics, Theory and Practice of Medicine, Surgery, Clinical Medicine, Physical Diagnosis, Clinical Surgery, Gynecology, Ophthalmology, Mental Diseases, Medical Jurisprudence, Public Hygiene, and Laryngoscopy.

RULES AND REQUIREMENTS FOR GRADUATION.

I. The candidate for the degree of Doctor of Medicine must have attained the age of twenty-one years, and be of good moral character. He must

have applied himself to the study of medicine for three years, must have attended three regular courses of medical lectures, and have attended at least his last course of instruction in this school; have prepared a satisfactory thesis of his own composition, and in his own handwriting, which must be submitted prior to his admission to examination.

II. Students who have attended one full course in any regular or recognized Medical College shall, upon satisfactory examination in the curriculum provided for the first year, be admitted as students of the *second course* in the University of California. Students who have attended two courses in any regular and recognized Medical College shall be admitted as students of the *third course* in this Institution, after having passed a satisfactory examination in the curriculum provided for the second year. Graduates of other regular Medical Colleges in good standing, shall be admitted as students of the *third course* in this Institution without any examination.

III. When a candidate applies to the Secretary of the Faculty for examination, he must give satisfactory evidence that the above rules have been complied with, which evidence will be presented by the Secretary to the Dean, by whom an order for examination will be issued.

IV. The candidate will pay the graduation fee on the presentation of the thesis to the Secretary, and upon receiving notice of having passed a satisfactory examination, he will enter his name on the Register for the purpose of being reported to the Board of Regents.

V. Candidates who have passed their examination, and in other respects complied with the regulations, are reported by the Secretary of the Faculty to the Dean of the University, who communicates such report to the Board of Regents, so that, if approved of by them, their order may be issued for conferring the Degree.

VI. The Commencement for conferring the Degree of Doctor of Medicine is held in the first week of November.

VII. For the convenience of such candidates as have at the close of the term not completed their full three years of study, and have complied with every other requirement, an examination will be held in the month of May, and the degree will be conferred upon such as are successful at the next regular Commencement. A certificate will be given, however, setting forth the facts in the case, which will be recognized by the State Board of Examiners, and a license to practice granted by them.

VIII. In accordance with the organic Act under which the University was incorporated, the Faculty will examine all candidates, whether educated in the University or in other schools. Such as come from other Colleges must have been examined by the Faculty of said College, and recommended by them as proficient candidates for the Degree. On passing the examination in the University, they may receive the Degree and Diploma, and rank as graduates of this Institution.

EXPENSES.

Matriculating fee (paid but once) -----	\$5 00
Fee for the First Course of Lectures -----	130 00
Fee for the Second Course of Lectures -----	130 00
Third Course of Lectures gratuitous for such as have paid for two full courses.	
Graduating fee -----	40 00

NOTE.—All fees are payable in advance to the Secretary of the Faculty, who will issue a general ticket to all the lectures. No promissory notes will be received, but such students as desire may obtain tickets for one or any number of the chairs separately.

BOOKS OF REFERENCE.

Anatomy—Gray's Anatomy, Wilson's Anatomy, Richardson's Anatomy.
Physiology—Dalton's Physiology, Draper's Human Physiology, Flint's Physiology.

Chemistry—Fowne's Chemistry, by Bridges.

Materia Medica—H. C. Wood's Therapeutics, Materia Medica, and Toxicology, Farquarson's Materia Medica, United States Dispensatory.

Surgery—Erichsen's Science and Art of Surgery, Gröss' System of Surgery, H. H. Smith's Operative Surgery, Toland's Lectures on Practical Surgery.

Principles and Practice of Medicine—Aitken's Practice of Medicine, Bennett's Practice of Medicine, Tanner's Practice of Medicine.

Clinical Medicine—Tanner's Clinical Medicine, DaCosta's Medical Diagnosis, Loomis' Physical Diagnosis.

Obstetrics and Diseases of Women and Children—Bedford's Principles and Practice of Obstetrics, Scanzoni's Diseases of Women, Thomas' Diseases of Women, Sims' Uterine Surgery, Simpson's Diseases of Women, West on Diseases of Children, Smith's Diseases of Children.

Ophthalmology and Otology—Troelsch on the Ear, Wells on Diseases of the Eye, Donders on Refraction and Accommodation.

Medical Jurisprudence and Mental Diseases—Maudsley's Physiology and Pathology of the Brain, Bucknell and Tuke on Insanity, Taylor's Medical Jurisprudence.

BOARDING.

Students may obtain good board in San Francisco at from *five to ten* dollars per week, and, if they desire, may live at a less expense.

N. B.—Students, on arriving in the city, should call at once upon the Secretary, Professor R. A. McLean, 603 Merchant Street, or the Dean, Pro-

fessor R. Beverly Cole, 518 Sutter Street, who will furnish all necessary information.

Letters must be addressed to the Secretary, at his office.

GRADUATES SESSION 1879.

Addington, D. M.	Michigan Bar, California.
Downs, George W.	Los Angeles, California.
Foote, Gilbert	Lockeford, California.
Gale, Herbert A.	Sacramento, California.
Howell, H. H.	Bishop Creek, California.
Hughes, L. J.	San Francisco, California.
Harmon, R.	Oakland, California.
Johnstone, A.	San Francisco, California.
Sparks, Agnes	San Francisco, California.
Smith, George S.	San Francisco, California.
Scott, A. W.	San Francisco, California.
Voigt, W. C.	San Francisco, California.
Younger, E. A.	San Francisco, California.



C.

College of Dentistry.



Cogswell Dental College.

This College was founded and endowed by the munificence of Dr. H. D. Cogswell, of San Francisco. The character and conditions of the endowment may be better understood from the following deed, which has been duly executed, recorded, attested, and approved :

DEED BETWEEN H. D. COGSWELL AND THE REGENTS OF THE UNIVERSITY OF CALIFORNIA.

This indenture made the nineteenth day of May, in the year of our Lord eighteen hundred and seventy-nine, between *Henry D. Cogswell*, of the City and County of San Francisco, State of California, the party of the first part, and *The Regents of the University of California*, an institution duly created, organized, and existing under the laws of the State of California, and by said laws placed under the charge and control of a Board of Directors known and styled as the Regents aforesaid, the parties of the second part, *witnesseth*: That the said party of the first part, for and in consideration of the sum of five dollars, to him in hand paid by the said parties of the second part, the receipt whereof is hereby acknowledged, hath bargained and sold, and by these presents doth bargain and sell forever unto the said parties of the second part and their successors, all that certain lot, piece, or parcel of land situate, lying, and being in the City and County of San Francisco, State of California, and particularly described as follows, to wit: *Commencing* at a point on the easterly line of Front Street, distant sixty (60) feet northerly from the northeast corner of the intersection of Front and Jackson Streets, thence northerly along said easterly line of Front Street sixty (60) feet to Clark Street, thence at right angles easterly and along the southerly line of Clark Street eighty-five (85) feet to and including the brick wall and the land on which stands the wall which now constitutes the rear or easterly wall of the building erected on the premises hereby conveyed, provided that said wall now is and shall remain forever a party wall between the premises hereby conveyed and the lot of land with its appurtenances lying to the east of the said premises, and if and when the said building is increased in height as hereinafter provided, the rear or easterly wall thereof, so far as built up to a greater height, shall also constitute a party wall between the said premises and the said lot to the east thereof, without being chargeable to the latter for any part of the cost of erecting it, thence at right angles southerly and parallel with Front Street sixty (60) feet, thence at right angles westerly

and parallel with Jackson Street eighty-five (85) feet to the easterly line of Front Street and point of commencing.

Together with all and singular the hereditaments and appurtenances thereunto belonging or in anywise appertaining; and the reversion and reversions, remainder and remainders, rents, issues, and profits thereof, and also all the estate, right, title, interest, claim, or demand whatsoever of him, the said party of the first part, either in law or in equity of, in, and to the above bargained premises and every part and parcel thereof.

To have and to hold all and singular the said hereinbefore granted and demised premises, with the appurtenances, unto the said parties of the second part and their successors forever, upon the trusts, nevertheless, and to and for the uses, interests, and purposes hereinafter limited, described, and declared, to wit:

1st. Until the improvement and enlargement of the building erected on said premises, to be made as hereinafter mentioned, the said parties of the second part shall at all times and continuously, in consideration of this conveyance, demise, let, and furnish unto the "*Cogswell Dental College of the University of California*," all and singular the second story of the brick building situated in said premises as it now exists, or so much thereof as the Faculty of said Dental College may require, except the portion thereof which is demised to said party of the first part by an indenture of lease of even date with these presents, to be used by said Dental College for the purpose thereof, and subject to such changes or alterations in the arrangement and partitioning of the said rooms as the Faculty of the said Dental College may deem it proper to make; *provided*, that when the said parties of the second part shall have made and completed the said improvement and enlargement for the said building, as hereinafter mentioned, then and thenceforth they shall demise, let, and furnish unto the said "*Cogswell Dental College*" one entire story in the said building for the exclusive use and purposes of the said College, said story to be selected by the Faculty of said College, and if the said parties of the second part in their discretion should deem it advisable, they shall furnish the said Dental College, gratuitously, with so much more room in the said building, beside the said story thereof, as they shall deem needful for its uses and purposes.

2d. That the parties of the second part shall use all proper efforts to rent or demise all the rest and residue of the said building, including the stores on the first floor thereof, to suitable tenants, for the highest and best rents that can be obtained therefor, and that after paying out of said rents the necessary expenses connected therewith, and with the maintenance and preservation of the said building, they shall employ the remainder, to wit: the net amount thereof, as an accumulation fund, which fund and interest thereof, if they shall be able to obtain interest on the same or any portion

of it, shall be kept augmenting until it has attained an amount or aggregate sum sufficient to enable the said building to be improved and enlarged by the addition of three new brick stories thereto ; that is to say, two full stories and such third story or half story as shall be afforded by a Mansard roof, which shall by them be placed on said building, and the said improvement and elevation, and any corresponding improvement in the portion of the building already erected, shall be made in such form and with such regard to finish, quality, and character of ornament as shall seem to the said parties of the second part best adapted to further and fulfill the purposes of the party of the first part in the creation of the said trust ; *provided*, that the stone tablet, with the inscription "*Cogswell's Building, 1859*," shall be permanently retained upon and constitute a visible portion of said building.

3d. That it may be at all times lawful and proper for the said parties of the second part, in order to facilitate and expedite the aforesaid enlargement and improvement of said building, to hypothecate and pledge the future rents thereof, as well those arising from the said building in its present form, as those which may ensue from the new portions of said building so to be superadded as and for a means of securing and paying for the cost of the said improvement, by obtaining a loan of money sufficient for that purpose, to repay which loan with interest said rents may be by the parties of the second part pledged and hypothecated ; and in case said loan is effected it shall be the duty of the parties of the second part to repay the same, with the interest thereof, out of the first net rents received by them, and before employing the said rents or any part thereof, for any of the other trusts herein created and specified ; *provided*, that the said party of the first part, H. D. Cogswell, shall have the first option or choice of making the said loan, and taking the said security therefor.

4th. After the building has been enlarged and completed as aforesaid, the said parties of the second part shall provide and furnish in perpetuity one entire story thereof to the said Dental College, and so much more of the room therein as they may deem needful, and as hereinbefore specifically provided.

5th. All the rest and residue of the said building, except that portion thereof which is demised to said party of the first part by an indenture of lease of even date with these presents, shall be let and rented by the said parties of the second part to suitable tenants for the highest and best rents that can be obtained therefor, and out of the net receipts from the said rents, after paying the necessary expenses connected therewith, and when said receipts become sufficient for that purpose, up to which period they shall be accumulated, if necessary, so as to constitute a fund in furtherance of the same object, they shall be appropriated by the said parties of the second

part to the payment of a monthly amount or sum of \$300, or \$3,600 per annum, for the establishment and maintenance of a Chair in the said University, which it is the further object of these trusts to create and endow, to be known and designated as the "Cogswell Chair of Moral and Intellectual Philosophy," and said sum shall be so appropriated in perpetuity or so long as the said parties of the second part shall be enabled to realize the same from the sources aforesaid.

6th. After appropriating the rents of the said premises as aforesaid, the parties of the second part shall appropriate such further net proceeds as shall result therefrom, one-half to the said Dental College, for the uses and purposes thereof, and one-half to the said parties of the second part, to be used in and under their discretion, as a means of contributing to the support and maintenance of such students in the said University as, from their lack of pecuniary ability, are incapable of supporting themselves during the period of a collegiate course, and who would otherwise for such reason be unable to obtain the benefit of an education in the said University; *provided*, that when such further net proceeds amount to the sum of \$600 per annum, the one-half thereof, namely, \$300, is to be appropriated to the said Dental College as aforesaid; then and thereafter all the increase of the said net proceeds over and above the said sum of \$600 shall be appropriated by the said parties of the second part to the full extent to which the amount thereof may increase at any time hereafter to the same object as that hereinbefore last above mentioned, to wit: to the support or maintenance of such students as from their said lack of pecuniary ability are incapable of supporting themselves during the period of a collegiate course, and who would otherwise for such reason be unable to obtain the benefit of an education in the said University, which fund last mentioned shall be known and designated as the "Cogswell Students' Relief Fund;" *and provided further*, that if at any time hereafter, in the discretion of the said parties of the second part, it shall be deemed desirable to use the said net proceeds over and above the said \$600, or any part of said net proceeds, for the purposes of said Dental College, either to pay for the services or salary of professors or lecturers, or to render the tuition in said College free and gratuitous, or for both of said objects, it shall and may be lawful for them so to do, and these trusts are upon the express condition that they may exercise, at all times, the said discretion, and so appropriate the said proceeds, or any part thereof, it being the wish of the said party of the first part that the said Dental College should be brought, by the parties of the second part, to as high a degree of character, scholarship, standard of tuition, and efficiency as exists in any similar institution.

7th. That the said premises hereinbefore conveyed, and their extension and enlargement and the accumulation derived therefrom, shall constitute

three several endowments by the said party of the first part, Henry Daniel Cogswell, and Caroline Elizabeth, his wife, namely, an endowment for the said Dental College, an endowment for the said Chair of Moral and Intellectual Philosophy, and an endowment for the said Student's Relief Fund, to the creation of which several endowments the party of the first part and his said wife are prompted by their desire to aid the cause of dental science and the cause of education.

8th. That the said parties of the second part shall and will keep the building erected upon said premises, and any addition, improvement, or enlargement made thereon as aforesaid, insured against loss by fire to an amount equal to two-thirds of the value of the said building, exclusive of the foundations thereof, consisting of the piles and capping which constitute the same, out of said fund.

9th. That in case the said parties of the second part should sell or mortgage the premises hereinbefore conveyed, or any part thereof, this conveyance and transfer shall thereafter be considered and be null and of no effect, and the property hereby conveyed shall revert to and become the property absolutely of the party of the first part, or his legal representatives.

10th. That the estate hereby conveyed, and the net proceeds thereof, shall constitute the sole and only fund and source from which the said trusts shall be sustained and the said endowments supported, and the moneys required therefor obtained, and the said parties of the second part shall not be liable in their individual or corporate capacity, nor shall the said University be liable to advance any further or other moneys, or become in any respect chargeable for any expense or charge whatever connected with the said trust.

In witness whereof, the said party of the first part has hereunto set his hand and seal the day and year first above written.

HENRY D. COGSWELL.

Signed, sealed, and delivered in presence of—

CAROLINE E. COGSWELL.

STATE OF CALIFORNIA,
City and County of San Francisco, } ss.

On the 19th day of May, A. D. 1879, before me, George T. Knox, a Notary Public in and for said city and county, residing therein, duly commissioned and sworn, personally appeared Henry D. Cogswell, known to me to be the person described in, whose name is subscribed to, and who executed the within instrument, and he duly acknowledged to me that he executed the same.

In witness whereof, I have hereunto set my hand and affixed my official seal, at my office in the City and County of San Francisco, the day and year last above written.

[L. s.]

GEORGE T. KNOX, Notary Public.

ESTABLISHMENT.

The College was organized by the adoption of the following resolutions :

Resolved, 1. That the Board of Regents of the University of California, in conformity with the terms of the deed executed by H. D. Cogswell, establish a Dental College, to be designated the "Cogswell Dental College," in which complete courses of instruction must be given in the Theory and Practice of Dentistry, consisting of such appropriate studies and lectures as may be determined by the said Board of Regents.

2. That the following Chairs be established in said College, to be filled by the Board of Regents, by the election of competent professors and instructors, as soon as may be practicable, namely :

- (1). A Chair of Operative Dentistry.
- (2). A Chair of Mechanical Dentistry.
- (3). A Chair of Regional Anatomy and Surgery.

Also, in connection with the "Medical Department" of the University of California, the following Chairs :

- (a). A Chair of Anatomy.
- (b). A Chair of Physiology.
- (c). A Chair of Chemistry.
- (d). A Chair of Surgery.

Also, such other Chairs, under appropriate designations, as the said Board of Regents may hereafter see fit to establish in said College.

3. That the Board of Regents will confer the Degree of "Doctor of Dental Surgery" at the end of the prescribed course upon such students as, having completed the same, are found proficient therein.

4. That the compensation of the professors and instructors in said College as well as other expenses of the same, are to be paid from the tuition fees of the students and the special endowment fund of said College, in such manner as the said Board of Regents may determine.

5. That the said College be organized in accordance with the several "requirements" of the donor, herewith submitted :

REQUIREMENTS OF THE DONOR IN RELATION TO THE ESTABLISHMENT OF THE
"COGSWELL DENTAL COLLEGE."

1. That twelve (12) free scholarships be granted to the donor or his legal representatives, he or they nominating the candidates for such scholarships, who, when found properly qualified, shall receive tuition in all branches of study required for the proper degree in the "Cogswell Dental College," free from all charge for the same.

2. That the Faculty of said College shall, as soon as practicable, organize a system of "free dental operations," for a class of persons who may be adjudged unable to pay for the same, to be kept open at such hours at said

College as may be arranged by the said Faculty. This is not intended to prevent the exaction of small charges for necessary supplies, sufficient to cover the actual cost of material used, for themselves and others not able to pay anything.

3. That when the "Cogswell Contingent Fund," as provided in the deed, becomes available, it shall be used—first, in small temporary loans to indigent and meritorious students in said College, of approved moral character and frugal habits; and second, in providing proper appliances for instruction.

4. That qualified females shall be received as students in the said College upon the same terms as males.

5. That no person of proper qualifications and of good moral character and habits shall be refused admission or graduation in said College, on account of nationality, color, politics, or religion.

(Signed):

H. D. COGSWELL.





D.

Department of Pharmacy.



California College of Pharmacy.

OFFICERS.

PRESIDENT.

WILLIAM GEARY.

FIRST VICE-PRESIDENT,

JAMES TOPLEY.

SECOND VICE-PRESIDENT,

JOHN T. BRADY.

CORRESPONDING SECRETARY,

JAMES G. STEELE.

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EDWIN W. JOY.

EDITOR,

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WILLIAM T. WENZELL, CHAIRMAN,

JOHN CALVERT,

EMLEN PAINTER,

A. L. LENGFELD,

CARL D. ZEILE,

F. C. BAUER,

W. M. SEARBY.

COLLEGE OF PHARMACY.

FACULTY.

JOHN LECONTE, M. D.-----PRESIDENT.

WILLIAM T. WENZELL, *Professor of Chemistry.*

W. M. SEARBY, *Professor of Materia Medica.*

EMLÉN PAINTER, *Professor of Pharmacy, and Dean of Faculty.*

HERMANN BEHR, M. D., *Professor of Botany.*

CLASS OF 1878.

NAME.	NATIVITY.	PRECEPTOR.
Burnett, George G.-----	Boston-----	G. G. Burnett.
Brown, Elmer Marvin-----	Oregon-----	Medical Student.
Crilley, William M.-----	Australia-----	J. J. McDonnell.
Day, Joseph Henry-----	Dayton, W. T.-----	Day Brothers.
D'Artenay, Eugene-----	Alton, Ill.-----	
Evans, Thomas A.-----	Bristol, Eng.-----	A. Evans.
Fraser, Thomas T.-----	Canada-----	J. W. Angell.
Gould, David F.-----	Boston-----	
Gage, William Henry-----	Stockton-----	J. H. Dawson.
Gove, David Jackson-----	San Francisco-----	Burt & Company.
Hunt, Denis Darwin-----	Frankfort, N. Y.-----	Redington & Company.
Hammit, Charles Henry-----	Knoxville, Tenn.-----	G. G. Burnett.
Hutchinson, Charles S.-----	Peabody, Mass.-----	
Herzog, Otto Herman-----	Detroit, Mich.-----	C. L. Steylaars.
Helke, William L.-----	San Francisco-----	
Hurtzig, William F. N.-----	Placer County, Cal.-----	W. J. Bryan.
Jones, Clarence F.-----	San Francisco-----	E. Painter.
Joy, Edwin Wolcott-----	Jacksonville, Ill.-----	C. A. Bayley.
Kelly, Darius W.-----	New Hampshire-----	

Lewis, Miss H. M.	San Francisco	Medical Student.
Morrison, William Parks	St. Johns, Canada	Coffin & Mayhew.
Messing, Louis Phillip	San José	A. M. Kurtz.
McDonnell, Samuel A.	Rome, N. Y.	G. G. Burnett.
Moore, Charles Crislie	Stockton	H. H. Moore.
McLaughlin, W. H.	Folsom	E. Painter.
Matthewson, James McL.	Scotland	W. D. Conard.
Minor, George W.	New York	W. J. Bryan.
Mervy, Emile Claude	San Francisco	A. Mervy.
Miller, George Harvey	Brooklyn, N. Y.	W. J. Dinsmore.
McDonough, John F.	Folsom, Cal.	H. P. Wakelee.
Murphy, Martin James	Monroe, Wis.	Crane & Brigham.
Ospina, Tulio	Medellin, U. S. Colombia	University California.
Ospina, Pedro N.	Bogata, U. S. Colombia	University California.
Pruett, J. A.	Missouri	Medical Student.
Parker, Ed. Silas	Chicago	LeFevre & Kahn.
Roethe, Louis Henry	Shasta, Cal.	C. Roethe.
Runyon, Ed. W.	Chicago	Redington & Company.
Schwartzman, Max	New York	C. L. Steylaars.
Sommer, Adolph	Germany	C. H. Mentz.
Summers, John F.	Sonora, Cal.	Medical Student.
Semler, Paul E. A.	Germany	Boericke & Tafel.
Smith, Arthur H. H.	New York	H. P. Wakelee.
Shuey, Miss Sarah	Illinois	Medical Student.
Thurston, Rufus L.	Fitchburg, Mass.	Medical Student.
Von Leudinghausen, A. W.	Germany	O. W. Von Leudinghausen.
Vreeland, Frank L.	Oil City, Penn.	A. L. Lengfeld.
Van Orden, Leander	Oroville	Medical Student.
Wappel, George	Marysville	E. Painter.
Weiss, Philip	Austria	
Winch, Frederick C.	Auburn, N. Y.	D. W. Ward.
Zemansky, Henry J.	New York	William Koeller.
Total		51.

COLLEGE OF PHARMACY.

[CIRCULAR.]

The Trustees of the CALIFORNIA COLLEGE OF PHARMACY desire to call the attention of all persons engaged in the drug business on the Pacific Coast to the following announcement of the lecture-course for the approaching session.

In no other part of the United States is there such need of the advantages which this College supplies. The long hours of business prevalent here, the frequent changes in the management of our various establishments, combined with other causes well known to every apothecary, render it difficult for employers to give systematic instruction to their assistants and apprentices in the various branches of science with which they ought to be familiar. This instruction the College provides, and the Trustees hope that employers will afford their assistants the requisite time to attend the lectures, as well as a short time every day for study.

The Trustees would also urge young men who may have entered the drug business without a liberal education to lose no time in making up this deficiency. In addition to a good English education, they should at least know enough of Latin to enable them to read prescriptions and pharmacopœias with readiness and accuracy.

Attention is directed to the change made in the time of commencing the lectures, and also to the fact that there will be five lectures each week instead of four as heretofore. This, it is believed, will be an advantage to the students which will be duly appreciated.

THE LECTURES

Will be delivered in the Hall of the Academy of Sciences, corner of Dupont and California Streets, on Tuesday and Friday evenings, and on Mondays at 1 p. m., commencing at the end of May, and terminating about the end of October. In order that the students may derive the fullest benefit from the lectures, they should be present at the opening of the session.

CHEMISTRY.

The lectures will be delivered on Tuesday and Friday of each week, at 7:30 P. M.

This course will present a systematic study of theoretical chemistry, according to the latest views of chemical philosophers.

Physics will be dwelt upon sufficiently for the illustration of the general properties of matter—the forces of gravitation, adhesion, and cohesion.

Caloric in its relation to chemistry will be treated of.

This will be followed by the laws of chemical affinity, the electro-chemical theory, symbols, nomenclature, and the laws of chemical combination.

A full and concise course of the chemistry of the non-metallic and metallic bodies is next taken up, comprising the more important elements, and those of special interest to the pharmaceal student.

The course to conclude with organic chemistry, in which the chemistry of the alcohols, ethers, organic acids, sugars, glucose, gums, starch, glucosides, alkaloids, etc., will receive their due share of attention.

MATERIA MEDICA.

The lectures will be delivered on Tuesday of each week, at 8:30 P. M.

The lectures on Materia Medica are devoted to those substances, chiefly of vegetable origin, which are used in medicine, and which are included under the general designation of *drugs*.

These articles are treated of in a systematic manner, notice being taken of the sources from which they are derived, their natural and commercial history, principal constituents, and remedial qualities. The ordinary and toxical doses, with antidotes to the latter, receive careful consideration.

The students are instructed as to the proper time for collecting the various vegetable products, as well as the best modes of preserving them. Attention is called to their physical properties as met with in trade, and to the leading characteristics of each drug. Substitutions, adulterations, and natural impurities, with the methods of detecting the same, are duly considered, as also the distinguishing features observed in articles of superior and inferior quality. The use of the microscope is shown as a means of identifying different drugs, and of detecting adulterations.

PHARMACY.

The lectures will be delivered on Friday of each week, at 8:30 P. M.

The introductory lectures to this course embrace the art of weighing and measuring; definition of the systems of weights and measures in use, and

authorized by the United States, British, French, and German Pharmacopœias; the theory and practice of obtaining the specific gravity of liquids and solids. A description of the apparatus necessary to the proper conduct of the business of the Pharmacist, and the purposes to which they are applied—such as Comminution, Solution, Filtration, Neutralization, Precipitation, Crystallization, and the management of heat in its application to the processes of Evaporation, Distillation, Sublimation, Calcination, etc., will be embraced in the regular course, in which the preparations and products, officinal in the United States, and other Pharmacopœias, together with such non-official preparations as may merit attention, will be considered.

It being impossible to consider each individual process minutely, it will be the chief aim to thoroughly elucidate those processes that are types of others; referring to the typical process whenever it can be done without depriving the student of valuable information, and drawing attention to any peculiarity or reason for modifying or deviating from the type.

By this method of instruction it is believed the student will acquire a comprehensive knowledge of his profession, and will readily find similarity between substances that are, physically, entirely different. Manufacturing and Extemporaneous Pharmacy will receive its full share of attention; and those processes that can be conveniently carried out by the Pharmacist will be minutely dwelt upon. The adulterations and sophistications, to which the officinal preparations are subject, and the methods of their detection, will be noticed to the extent their importance may demand.

BOTANY.

The lectures will be delivered on Monday of each week, at 1 p. m.

The lectures include structural, functional, and systematic botany, and the geography of plants. In addition to these weekly mid-day lectures, excursions will be made into the country on alternate weeks during the session, for the purpose of collecting and studying indigenous plants, under the direction of the Professor.

CONDITIONS OF GRADUATION.

1. The candidate must be of good moral character, and have attained the age of twenty-one years.
2. He must have attended two full courses of lectures given by this College, or one of those given by some other College of Pharmacy whose conditions of graduation are based upon the like term of service, and the final course in this College.

3. At the time of the final examination for the degree of Graduate in Pharmacy, the candidate must have had at least three and a half years' practical experience; but he shall not receive his diploma until he shall have completed the term of four years' service.

4. Candidates for graduation will be subjected to a written, oral, and practical examination.

a. The examination will embrace questions in Theoretical and Pharmaceutical Chemistry, Botany, Pharmacognosy, and Materia Medica, a knowledge of the United States Pharmacopœia, of the various systems of weights and measures, of the maximum doses of powerful remedial agents, of the antidotes for poisons, and the translation of Latin prescriptions.

b. The practical examination will comprise the analysis as to identity and purity of simple medicinal chemicals, the actual compounding of prescriptions requiring skill and judgment, the identification of specimens in the several departments, and the making of Chemical and Pharmaceutical preparations.

5. No special examination will be held, but only one regular examination at the end of the regular course.

6. Each candidate must present an original thesis written in English, in his own hand-writing, and also pass his examination in English.

7. He must be recommended jointly by the Professors and the Examining Board, which recommendation will be acted upon by the Regents of the University of California, by whom the degree is conferred (the College of Pharmacy being affiliated with the University).

8. Any student who has not had the full three and a half years' service here referred to, but who has complied with all the other conditions of graduation, may present himself for examination, and, should he receive the requisite number of credits, will be awarded a "Certificate of Proficiency," upon which he will afterwards be entitled to a diploma on producing evidence of having completed the four years' practical experience.

FEES.

Lecture tickets (for the season)	\$50 00
Matriculation ticket	2 50
Diploma fee.....	10 00

The matriculation and lecture tickets must be taken out by each student in person, and must be indorsed, the former within fifteen and the latter within thirty days from the beginning of the lecture course.

Members and graduates of the College, and students who have attended two sessions in the College, are admitted free to the lectures. Students in any of the departments of the University of California and in the Medical

College of the Pacific will be admitted to the lectures free by matriculating and paying only for the matriculation ticket. Medical students, or others, not intending to pursue pharmacy as their vocation, will be admitted to the lectures, or any one of the courses they may desire to attend, by paying the matriculation fee and that of the chair or chairs of instruction, and such students will enjoy the same advantages as regular students of pharmacy, except that they will not be eligible to the degree of Graduate in Pharmacy.

CLERKS AND STUDENTS.

Drug clerks and students on coming to the city, and those out of employment here, who are desirous of obtaining situations, may call on the Dean of the Faculty and register their names.



LIST OF GRADUATES.

1874.

J. P. HEANY.....Thesis, "Oreodaphne Californica."

1875.

ROBERT C. MEYERS....."Sesame Oil and its Uses."

THOMAS D. GRAHAM....."Oxytropis Campestris."

GASTON E. BACON....."Various Analyses of Tincture of Opium."

ADOLPH J. KAHN....."Pharmaceutical Education."

F. P. McLEAN....."Analysis of Magnesites."

1876.

NATHAN ROGERS....."Sium Latifolium."

FREDERICK E. RAY....."California Opium."

HENRY R. HARRIS....."Hydrocyanic Acid."

1877.

F. C. BAUER....."Analysis of Well Water."

JOHN DEVINE....."Seidlitz Powders."

JOHN M. CURRAGH....."Damiana."

EDWARD SELZER....."Percolation vs. Maceration."

1878.

S. A. McDONNELL....."Dialyzed Iron."

EDWIN W. JOY....."Fluid Extracts by Re-percolation."

C. C. MOORE....."Analysis of Soil."

W. H. McLAUGHLIN....."Eriodictyon Glutinosum."

ED. S. PARKER....."Aspidium Argutum."

W. S. HELKE....."Erythroxylon Coca."

J. H. ZEMANSKY....."Nicotiana Tobacam."

PHILLIP WEISS....."Leeches."



SUMMARY OF STUDENTS.

SUMMARY.

COLLEGES OF SCIENCE AND OF LETTERS (UNDERGRADUATE).

Total	268
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COLLEGE OF LAW.

Total in College	159
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COLLEGE OF MEDICINE.

Total in College	50
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COLLEGE OF PHARMACY.

Total in College	51
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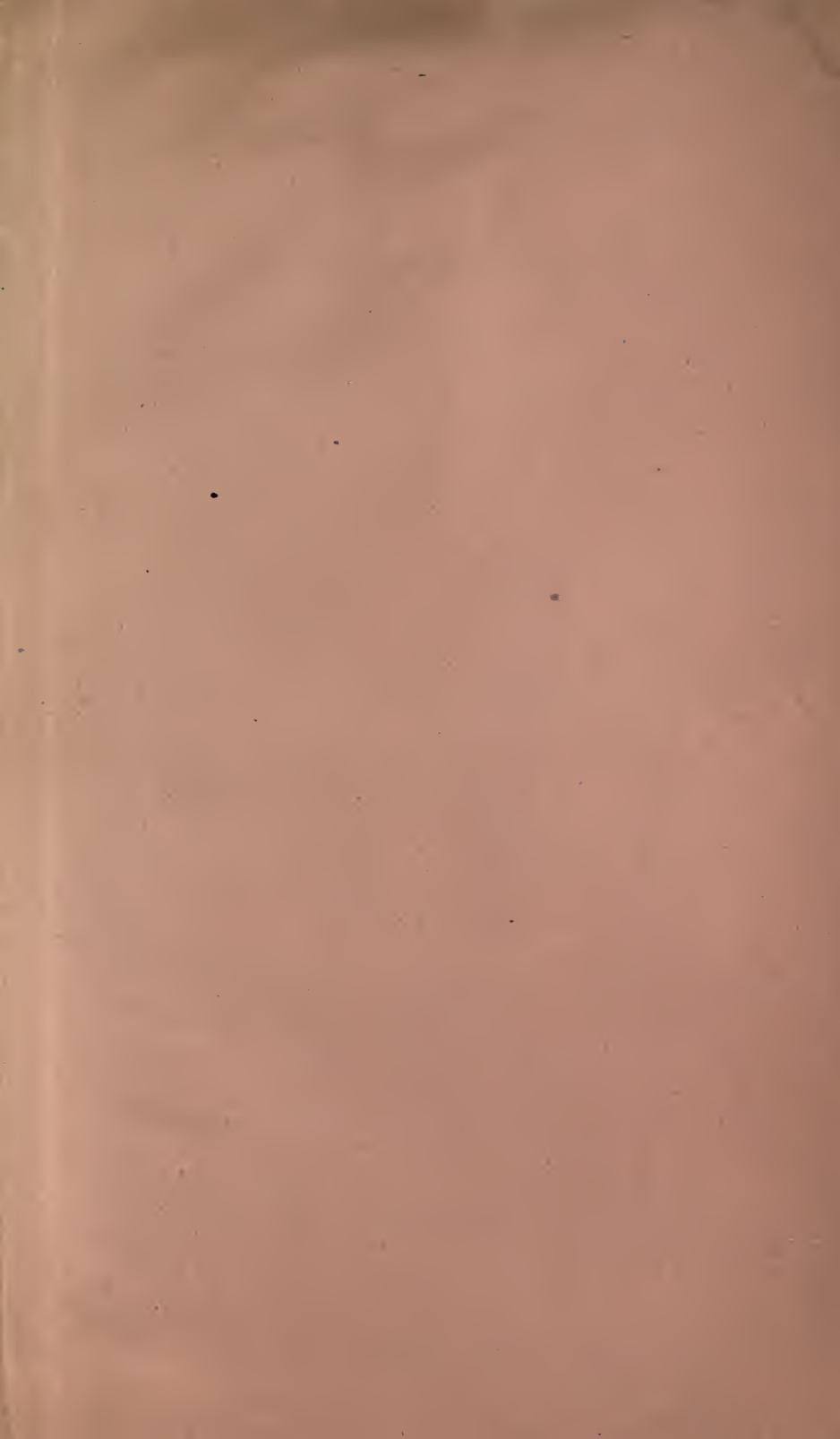
Total	528
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Total in University	524
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Students counted twice	4
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